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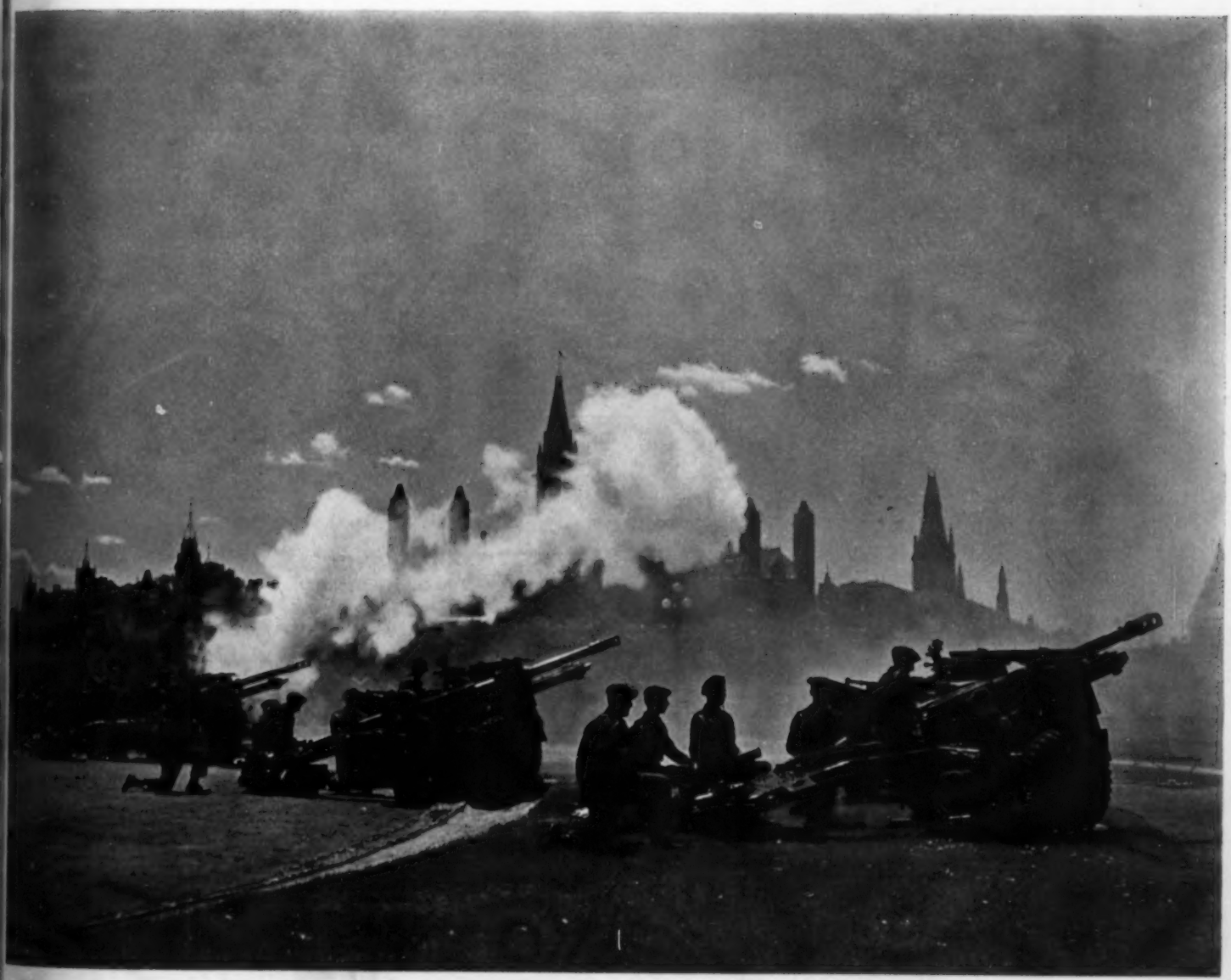
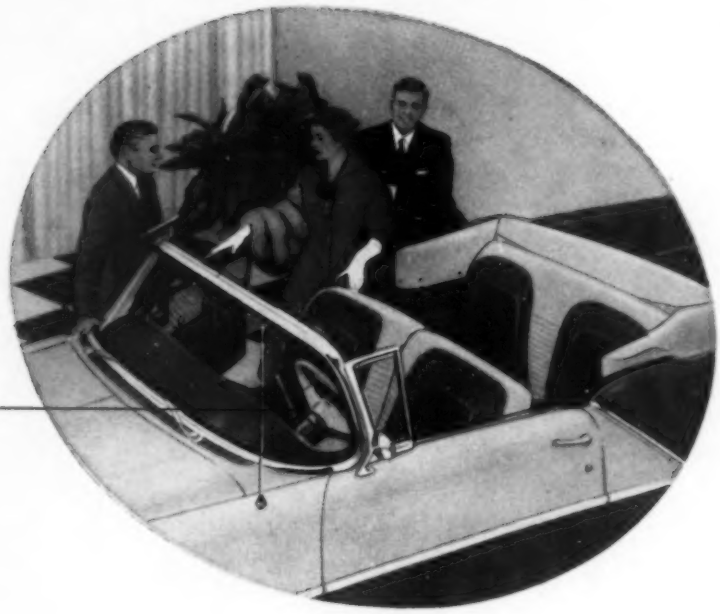
CANADIAN GEOGRAPHICAL JOURNAL



TAKE
THE
WHEEL



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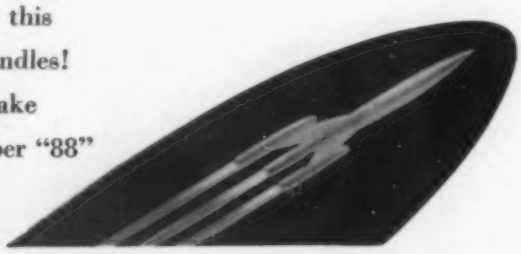

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THE CANADIAN GEOGRAPHICAL SOCIETY

OTTAWA, CANADA

The Society's ambition is to make itself a real force in advancing geographical knowledge, and in disseminating information on the geography, resources and people of Canada. In short, its aim is to make Canada better known to Canadians and to the rest of the world.

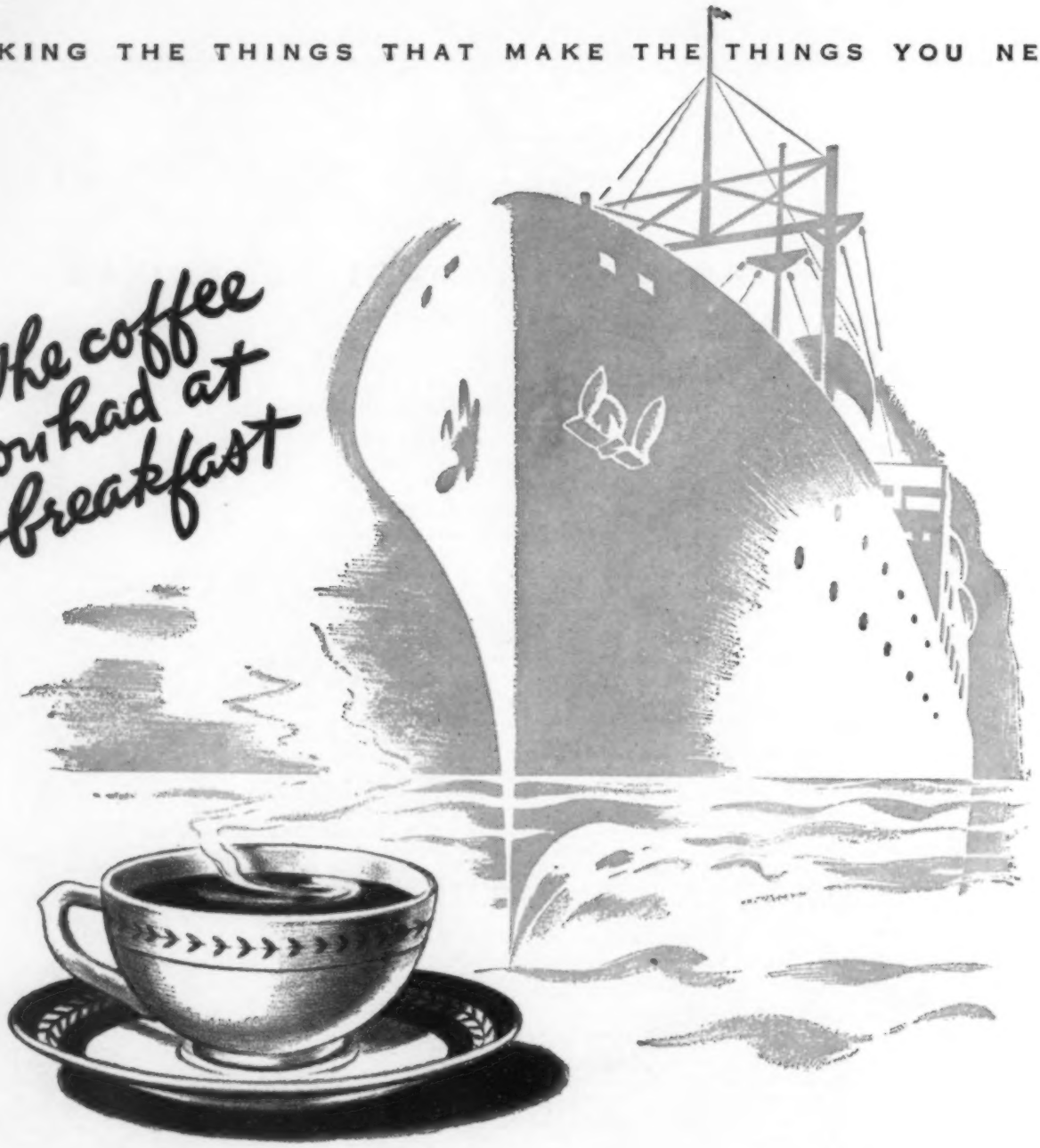
As one of its major activities in carrying out its purpose, the Society publishes a monthly magazine, the Canadian Geographical Journal, which is devoted to every phase of geography — historical, physical and economic — of Canada, of the British Commonwealth and of the other parts of the world. It is the intention to publish articles in this magazine that will be popular in character, easily read, well illustrated, and informative.

The Canadian Geographical Journal will be sent to each member of the Society in good standing. Membership in the Society is open to any one interested in geographical matters. The annual fee for membership is four dollars (Canadian currency).

The Society has no political or other sectional associations, and is responsible only to its members. All money received is used in producing the Canadian Geographical Journal and in carrying on such other activities for the advancement of geographical knowledge as funds of the Society may permit.

MAKING THE THINGS THAT MAKE THE THINGS YOU NEED

The coffee you had at breakfast



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CANADIAN GEOGRAPHICAL JOURNAL

Published monthly by
THE CANADIAN GEOGRAPHICAL SOCIETY
Ottawa, Ontario

Editor - GORDON M. DALLYN — Assistant Editor - MALVINA BOLUS

This magazine is dedicated to the presentation in authentic and popular form, with extensive illustrations, of the broad pattern of Canadian life and its industrial, physical, and cultural foundations.

The articles in this Journal are indexed in the *Canadian Index* which may be found in any public library.

The British standard of spelling is adopted substantially as used by the Government of Canada and taught in most Canadian schools, the precise authority being the Concise Oxford Dictionary, fourth edition, 1951.

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JULY, 1954 ✦ VOLUME XLIX ✦ NUMBER 1

COVER SUBJECT:—*A Royal Salute fired on the occasion of Her Majesty's birthday by the 30th Field Regiment, Royal Canadian Artillery (Militia) at Ottawa.*
Royal Army photograph

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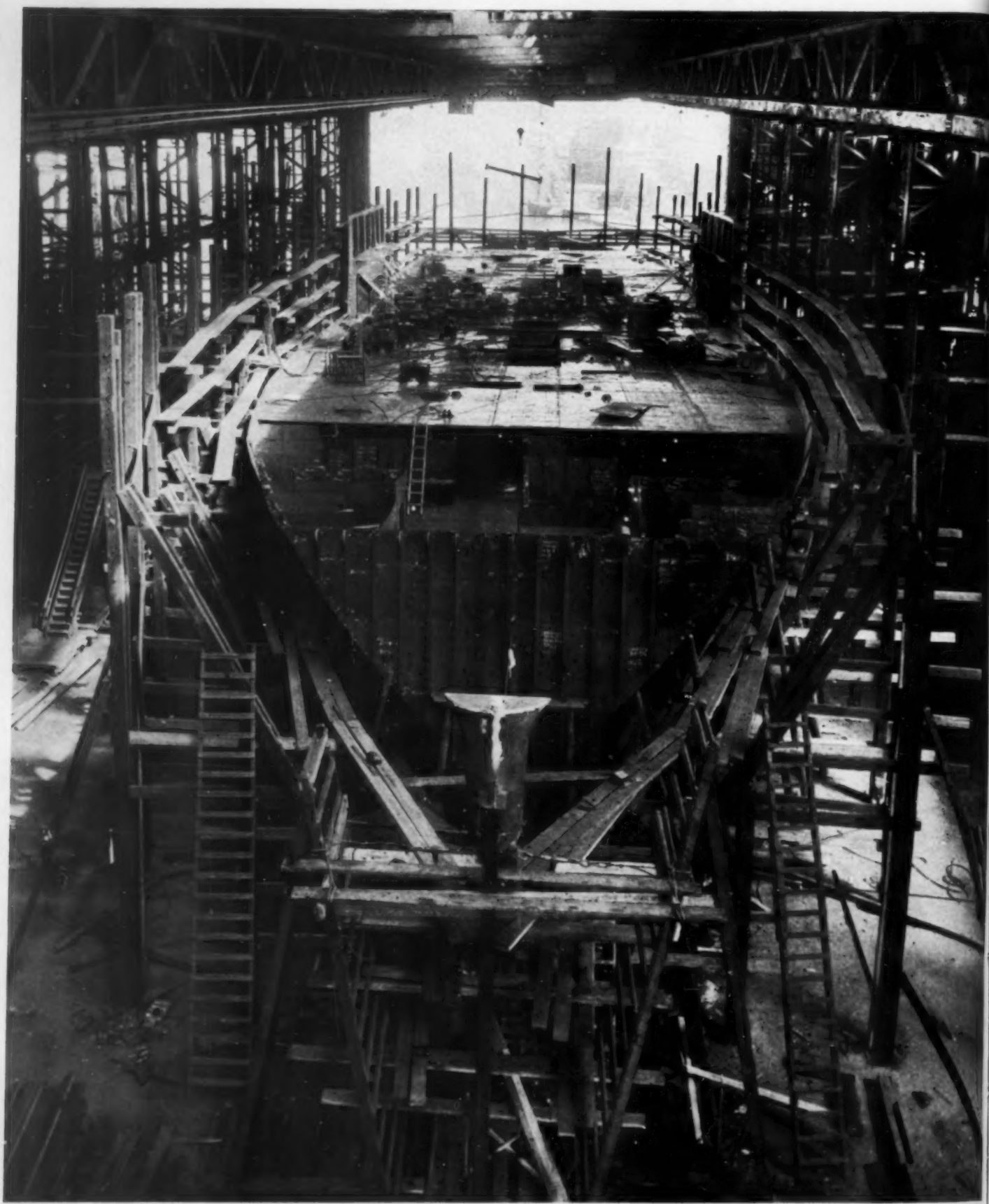


On the keel blocks the ship takes form.

Grateful acknowledgment is made to the member shipyards of the Canadian Shipbuilding and Ship Repairing Association who were kind enough to supply photographs.

From the drawing office the hull plans go to the mold loft.

Shipbuilding in Canada

by ANGUS McGUGAN

A SHIP is of all manufactured things the least inanimate. No ship has ever left a builder's yard without taking from the men who designed and built her something of a soul.

A ship begins its life in the drawing office. Here the naval architect and owner confer and discuss the conditions to be fulfilled. The ship's carrying capacity, speed, power and radius of action and a thousand and one pertinent questions are settled, be she a ship with the fine lines and speed of an ocean greyhound or the solid squat form of a 10-knot tramp.

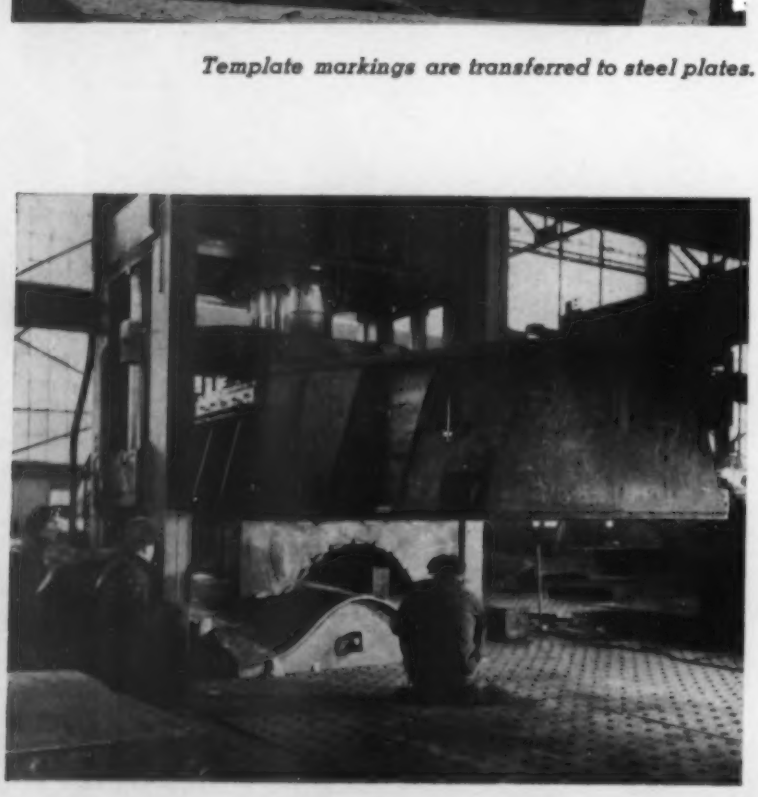
Compared with the spaciousness and proverbial noise of the shipyard, the drawing office has an air of compact quiet detachment. The silence can be felt. It is broken only now and then by the purr of a parallel rule rolling across the drawing board—the swish of drawing paper being unrolled or the low-pitched conversation of men talking of scantlings—displacement—metacentres—deadweight—stability; words the meaning of which only the naval architect and his ilk can readily comprehend.

By this relatively small section of the total shipyard population, the design of the ship is

A ship begins its life in the drawing office.

From the chalk lines men create wood templates.

Template markings are transferred to steel plates.



created. The design drawings, shopworking drawings and detailed plans are produced; more than a thousand for an ocean-going tanker and in the neighbourhood of three thousand for a naval destroyer.

From the drawing office the hull plans go to the mold loft. Here is a room with a floor area as large as a hockey arena. With the exception of a few benches around the walls it is devoid of furnishings or machinery; a clear floor area as if the schoolroom blackboard had been laid on the floor and enlarged to the nth degree. On this floor the shape of the vessel is laid down full size. In a maze of chalk lines the practised eye can follow the curve of the hull and pick out every plate and frame. From these chalk lines men fashion wooden templates and bevels from which the steel plates and frames will be shaped and bent. The mold loft is the halfway house between the drawing office and the plater's shed—the transfer point from theory to practice—the intermediary between the white-collar man and the black squad.

In the plater's shed the templates are in the skilled hands of a race of men who for a lifetime fashion steel plates and frames until each and every one assumes its destined form. To the old-timers things are changing in the plater's shed: the clang of punching and shearing machines, the rivet boy with his charcoal fire, the incessant din of the rivet hammer, all are gradually giving way to the silent eerie glow of the electric-welding age.

Meanwhile, on the building-way shipwrights are laying the keel blocks, row after row of crisscross timbers on which the backbone of the ship is laid, strong enough to support the weight of the hull as the ship takes form. A foundation, yes, but only a temporary resting place for a ship yet unborn.

On the keel blocks men are erecting frames—floors—bulkheads—stem—stern post and plating. Soon there comes a day when the skeleton of the ship is completely clothed in the coarse fabric of steel. The outside of the ship is cleaned and painted. Three thousand tons of steel await the moment when the gentle touch of a woman's hand will send one more ship down the launching ways into the murky water to enjoy the first exhilarating experience of her buoyancy.

In the platers' shed skilled hands fashion plates and frames.

The great day arrives. The staging has been removed. The ship seems to have taken on added height as she rests on the launching ways. Everything around is shipshape and "Bristol-fashion". The launching party is on the platform. In the hushed stillness of the yard the ship is blessed. Here, in this moment of quiet expectancy, one wonders if this ship and all who sail in her will be spared the anxiety of Atlantic convoys and the cold terror of the "cruel sea".

The ship is being named. The beribboned bottle of champagne goes into a thousand fragments. The triggers are released. The ship moves slowly as if awakening from a great sleep, speeds up, gains momentum and slides into the troubled water as helpless and unhopeful as a new-born thing. A great day we say, but to the workmen in the shipyard there is nothing so saddening or forlorn as an empty building berth.

Out in the river tugs are nudging the ship into position alongside the fitting-out wharf. The second stage in the building begins.

Fitting-out, as the term implies, is the period when the propelling machinery is installed, together with electrical equipment, plumbing, heating, air-conditioning, cooking and messing gear fitted and all the heterogeneous conglomeration of items that go to form part of a modern vessel. Concentrated in one ship can be found workmen representative of all trades necessary to build and equip a power house, radio station and a modern hotel.

Months later the owner takes over the vessel. The ship heads down the river for the open sea to begin her life as a full-fledged unit in international sea transport. A fresh page is being written in the history book of ships built in Canada.

What manner of book is this ? To those who have heard the sea gulls cry and can say "the sea is in my blood", it is a romantic story of ships and men—it is the story of Canada from its early beginning until this day. In its opening chapter the story tells of one, François Gravé, Sieur de Pont-Gravé, who, in 1606, built two ships on the shore of Port Royal, Nova Scotia, known today as Annapolis Royal. The ships were not built as a commercial

Co-ordination of brawn and brain.

The silent eerie glow of the electric age.

Intricate curves are no problem for this portable-burning machine.

The great day arrives—everything around is shipshape and Bristol fashion.

enterprise but as a means of escape from impending starvation.

Glancing quickly over the pages of time we find that in 1671 the great intendant Jean Talon received a grant of "40,000 livres from the King of France to be employed for the construction of vessels in Canada as well as for the cutting and working of woods sent out of the country for ships being built in ports of the Kingdom".

Shipbuilding in Canada as a commercial enterprise seems to have had its beginning in 1731. Intendant Hocquart established a shipyard on the banks of the St. Charles River, Quebec. As an incentive to the industry the French Minister of Marine, M. de Maurepas, offered a premium of 500 francs for every merchant vessel of 200 tons and over built in the Colony and sold in France. Having in mind present-day shipbuilding problems it is interesting to note that the industry was subsidized by the government over two hundred years ago.

By 1800 shipyards had sprung up in the creeks of New Brunswick, Nova Scotia and Quebec, building ships of considerable size for that period. Most of the ships were sent across to the United Kingdom to be sold. Between 1850 and 1860 shipbuilding became one of Canada's major industries, shipyards from the Great Lakes to the Maritimes adding their fair share of celebrated craft ranging the whole world. Names like *Ben Nevis*, *Golden Age*, *White Star*, *Morning Light* were enshrined in the pages of marine history in The Golden Age of Sail.

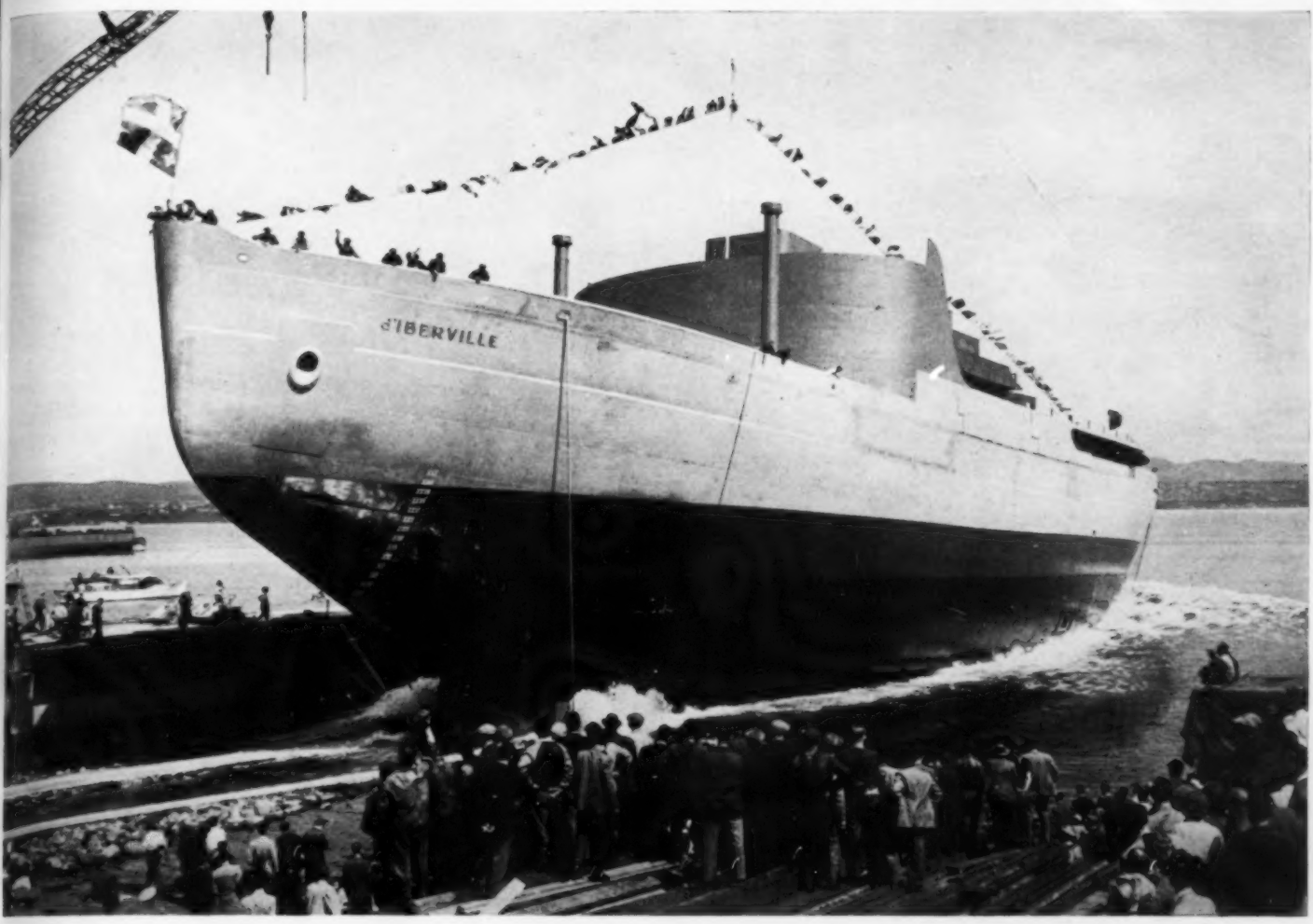
The Canadian Merchant Marine in 1875 numbered 7,196 vessels, aggregating 1,333,015 tons which gave her fourth place among the shipowning nations of the world. But long before 1875 the iron and steel tramp steamer was gradually pushing the square riggers off the sea.

In Great Britain mechanical genius was asserting itself. The emergence of James Watt (1736-1819) an engineer and an applied scientist, with his idea of a separate condenser working in conjunction with the steam engine, is considered by many engineers as the start of the Industrial Revolution.

In Canada the idea of steam propulsion was taking root. In 1809 John Molson of Montreal built the small paddle-driven steamer *Accommodation* for a passenger service between Montreal and Quebec; the wooden vessel was 85 feet in length and was powered by steam machinery built in Britain.

In 1833 the *Royal William*, built in 1831 for the Canadian coastal trade, made the Atlantic crossing from Pictou, Nova Scotia, to Cowes, England, in seventeen days, claiming the honour to be the first merchant vessel to make this passage under steam all the way.

In 1844 Robert Napier, the Clyde shipbuilder was partly responsible for procuring from Lloyd's a decision to grant the certification A1 to iron ships. By 1870 Randolph Elder &



The ship slides into the water as helpless and unhopeful as a new-born thing.

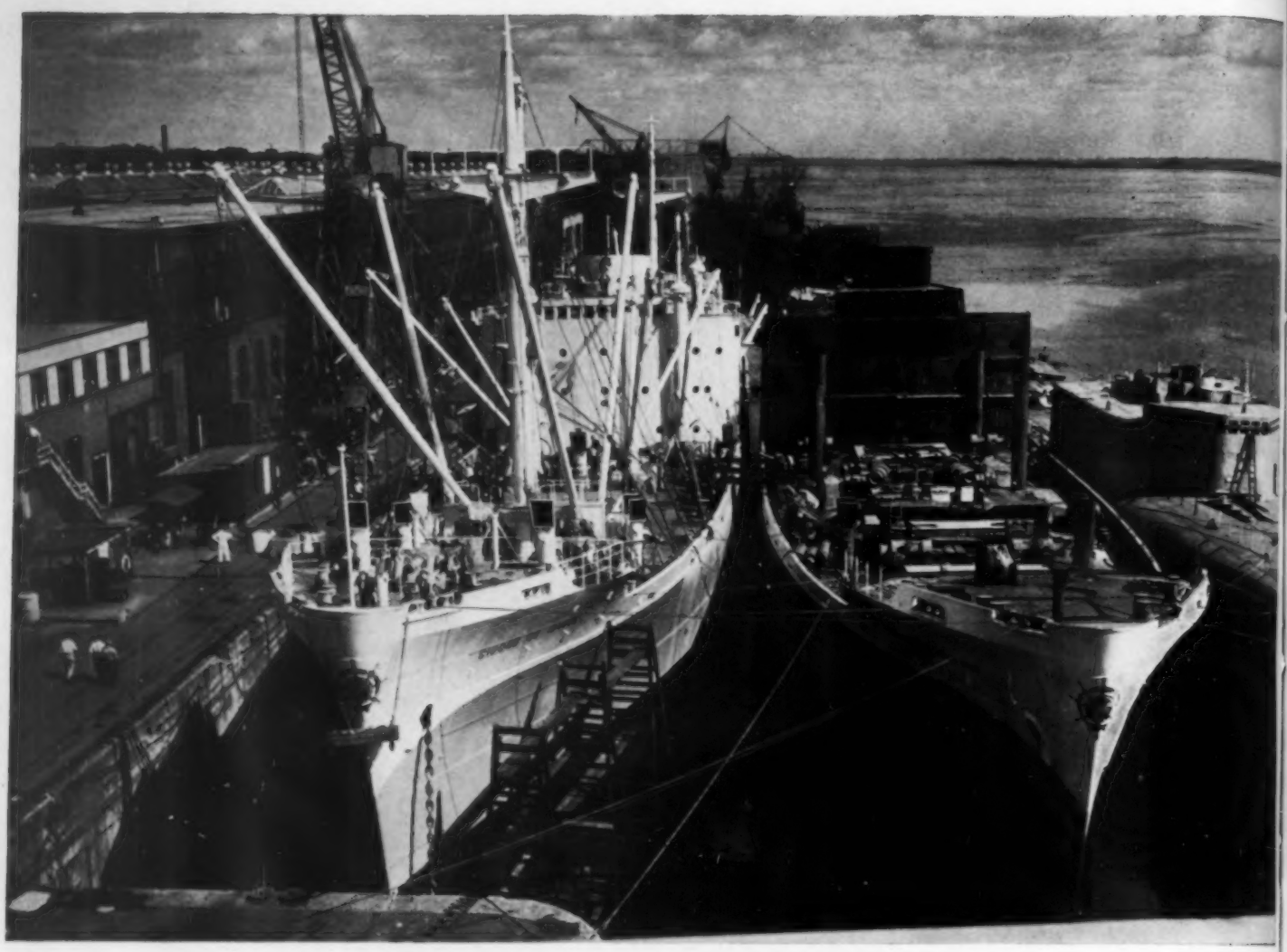
Company, Shipbuilders, Govan, Scotland, had become the largest private shipyard in the world, employing over 4,000 men. The isolation of the New World was over—North America was only fourteen days away. The age of progress in steam had begun.

In the economic process that led ultimately to the defeat of the sailing ship, Canada lost one of its major industries. Apart from the replacement of wooden hulls by steel and the development of the marine engine, three clearly marked crises contributed to the decline of the sailing ship: first, the advent of the Crimean War which produced a boom in shipbuilding followed by a slump in which the steamers took from sail the bulk of available cargo; the cutting of the Suez Canal, reducing the passage to and from the East by thousands of miles and yet denying the facility to sailing vessels was the second blow, and, finally, the completion of the Panama Canal, which spelt doom to the windjammer as a competitor for ocean trade.

At the beginning of the twentieth century, the building of large wooden sailing ships was practically extinct. It is true that some Canadian shipyards did adapt themselves to changing conditions, built sailing ships with iron hulls, and pioneered with the development of steam propulsion, but, in comparison with the days of 1870, shipbuilding fell to a low ebb.

The outbreak of World War I gave a new impetus to the shipbuilding industry, and

H.M.C.S. Porte St. Louis—*a trawler gate vessel built for the R.C.N. in 1952*



Fitting-out period—the second stage in the building of a ship.

Canada achieved a level of production that was tremendous in volume for its day and vital in necessity. In 1919, the gross value of the products of the shipbuilding and ship-repairing industries reached approximately 90,000,000 dollars.

In the interval between 1922 and 1939, the industry suffered an appalling slump and was left to languish on nothing but ship repairs and the construction of a few minor craft. In the immediate years preceding 1939, the total number employed in the shipyards and boat yards ranged between 2,800 and 3,600 men and the yearly gross value of products averaged about 11,000,000 dollars.

In World War II Canada recaptured its place as the third largest shipbuilding country. Canadian shipbuilders and ship-repairers, by their enterprise, skill, and tenacity of purpose, built and repaired ships in tonnage and numbers undreamt of in pre-war years. In the year 1943, the gross value of shipyard production reached the unprecedented level of 412,000,000 dollars. Canadian shipyards have a very special achievement to their credit—the growth, practically overnight, of shipbuilding facilities was an industrial feat of the greatest importance and one that had a vital influence on the successful war effort of the Allies. From peacetime nucleus of approximately 3,000 men, Canada by her enterprise created a major industry employing more than 66,000 men in the shipyards on new construction and an additional 15,000 or more on ship repairs.

From Canadian shipyards, during World War II, sailed more than four hundred fighting ships which gave a good account of themselves, some three hundred and ninety-eight cargo vessels and tankers (representing 3,774,000 D.W.T. of shipping) which contributed in substantial measure to the merchant shipping

of the Allies. Add to this over six thousand miscellaneous craft—tankers, tugs, patrol craft, lighters, scows and on down the line to the lowly 14-foot drop keel dinghies.

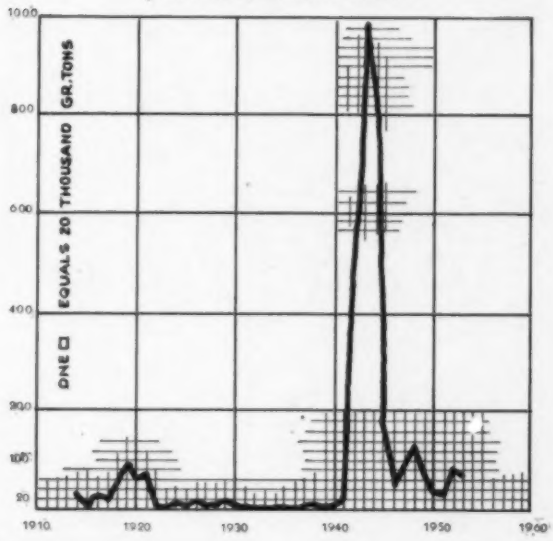
The revitalized shipbuilding industry created a vast demand for Canadian-made marine equipment. To augment the supply of engines and boilers produced by the shipbuilders, numerous manufacturing plants turned to the production of these units and they, together with hundreds of manufacturing plants that produced the components, deserve much of the credit for Canada's shipbuilding record. To them fell the task of producing auxiliary machinery, valves, electrical equipment and ancillaries in numbers almost beyond computation. Nor can we forget the enterprise and ingenuity of the machine shops of the mines and paper mills through Canada; though located, in many instances, thousands of miles from the nearest shipyard they produced marine equipment second to none.

To get a relative comparison of Canada's shipbuilding war effort, it is good to remember that the United States of America, with a population of approximately 148,000,000 people delivered 12,000,000 gross tons of merchant shipping in the peak year (1943) of World War II, whereas Canada, with approximately 12,000,000 of a population produced in that same year almost 1,000,000 gross tons of merchant ships.

In a vast country such as Canada with sea coasts more than 3,000 miles apart, it was natural that the shipbuilding effort of World War II should bring together, at one time or another, management and staff of the major shipyards in the country in a co-operative effort to solve the many technical and production problems which arose. To carry on this spirit of friendly co-operation in the post-war years, the Canadian Shipbuilding and Ship Repairing Association, with headquarters at Ottawa, was formed in 1944—its object, "the preservation, maintenance and development of shipbuilding and ship repairing industries in Canada".

Through the combined efforts of the member yards of the Association and the Government the immediate post-war years (1945-1948)

Gross Tonnage of Merchant Ships delivered in the years 1914-1953 inclusive

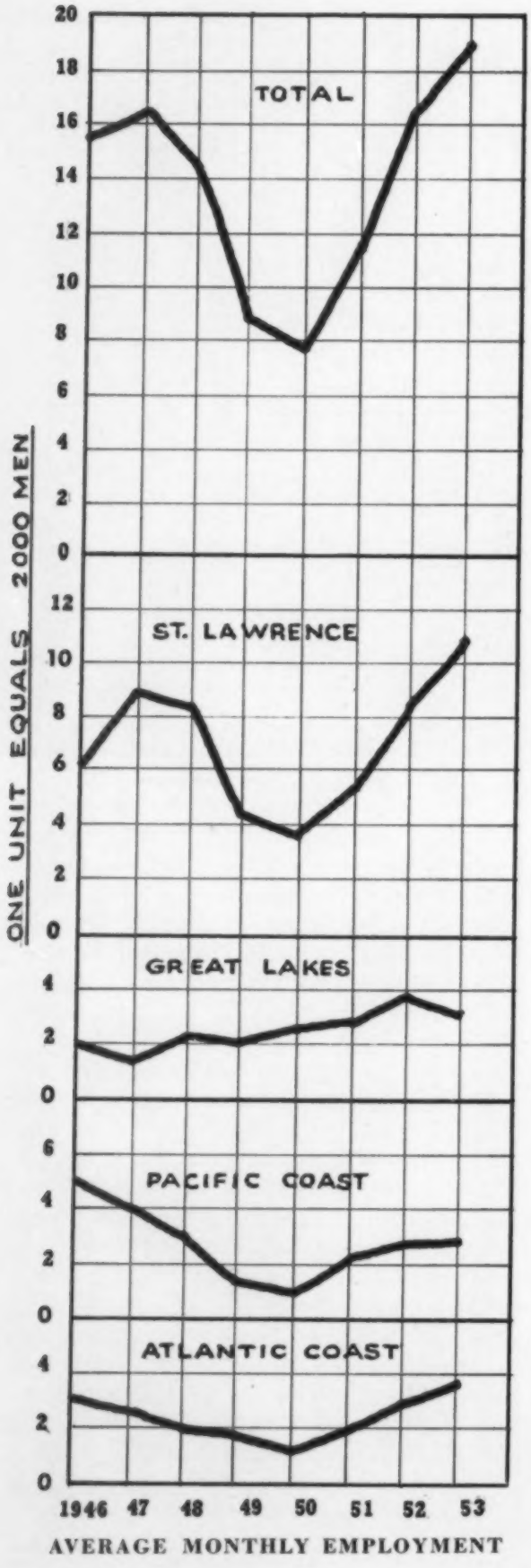


Number and Gross Tonnage of Self-propelled Steel Merchant Vessels of 500 Tons Gross and Over

and

Number and Displacement Tonnage of Naval Vessels Built in Canadian Shipyards 1914 - 1953

	Cargo		Tanker		Passenger or Cargo-Passenger		Naval	
Year	No.	Gr. Tons	No.	Gr. Tons	No.	Gr. Tons	No.	Disp. Tons
1914	2	16,073			4	8,843	40	11,716
1915	1	733					255	75,228
1916	4	15,672	3	6,098			9	3,600
1917	4	15,318	2	5,262			32	9,421
1918	18	47,320			1	2,383	55	16,085
1919	25	99,188						
1920	14	57,855	1	640	1	3,600		
1921	15	67,284			2	9,471		
1922	2	9,417						
1923	3	4,810			1	1,243		
1924	2	15,397			1	600		
1925	4	13,195			1	795		
1926	6	16,947			3	3,378		
1927	5	10,130			1	6,328		
1928	5	3,233			2	14,028		
1929	7	20,404					2	634
1930	7	11,664			1	841		
1931	1	1,103			1	5,889		
1932	1	1,231					1	157
1933							1	140
1934					1	531		
1935								
1936								
1937			1	1,585				
1938			1	1,512	3	2,308	2	886
1939			1	1,610	1	348	1	140
1940			1	2,238			14	12,387
1941	1	7,131			1	1,179	71	64,932
1942	84	602,045					50	44,490
1943	139	940,589	5	31,202			70	82,946
1944	109	724,845	13	69,559			97	120,808
1945	39	186,774					68	110,157
1946	26	34,769	1	1,500	4	15,759	1	2,390
1947	16	46,316			7	37,291	1	2,390
1948	41	115,566	3	8,839	4	7,958	1	2,390
1949	16	51,503			4	15,255		
1950	10	20,754	1	2,153	5	16,552		
1951			3	24,319	1	5,074	3	404
1952	6	55,730	2	25,275			4	1,565
1953	8	47,198	1	17,845	2	9,588	4	1,777
	621	3,260,194	39	199,637	52	169,242	782	564,643



brought to the Canadian shipbuilding industry a period of prosperity far greater than had been anticipated at the war's end. The reputation which Canada had built up during the war was now standing her in good stead.

The year 1945 was the clean-up year in Canadian shipyards; naval vessels or merchant ships for government account were completed or cancelled—sights were set on obtaining orders for ships for foreign countries—early delivery was of more importance than cost.

By 1946 Canada ranked fourth among the shipbuilding nations of the world. Seventy-five per cent of orders on hand were for export to owners in France, the Netherlands, Portugal, Brazil, Argentina and China. Thirty-one merchant vessels were delivered in that year, aggregating 53,000 gross tons.

In 1947 a greater variety of types of ocean-going ships was delivered than in any previous period in Canadian history. While only twenty-three vessels were delivered, the total gross tonnage exceeded 83,000.

The year 1948 saw the upward trend of post-war merchant shipbuilding in Canada reach its peak. A total of eighty-four vessels, aggregating 154,248 gross tons, was delivered. Average monthly employment in the major yards in 1945 was 35,495; by 1948 it had dropped to 14,596. Early delivery of vessels from Canadian yards was being matched elsewhere. Prices had once again become the dominant factor. The revitalized shipyards in France, Germany and Japan were back in production. It looked as though the lean years in Canadian shipbuilding had rolled around once again.

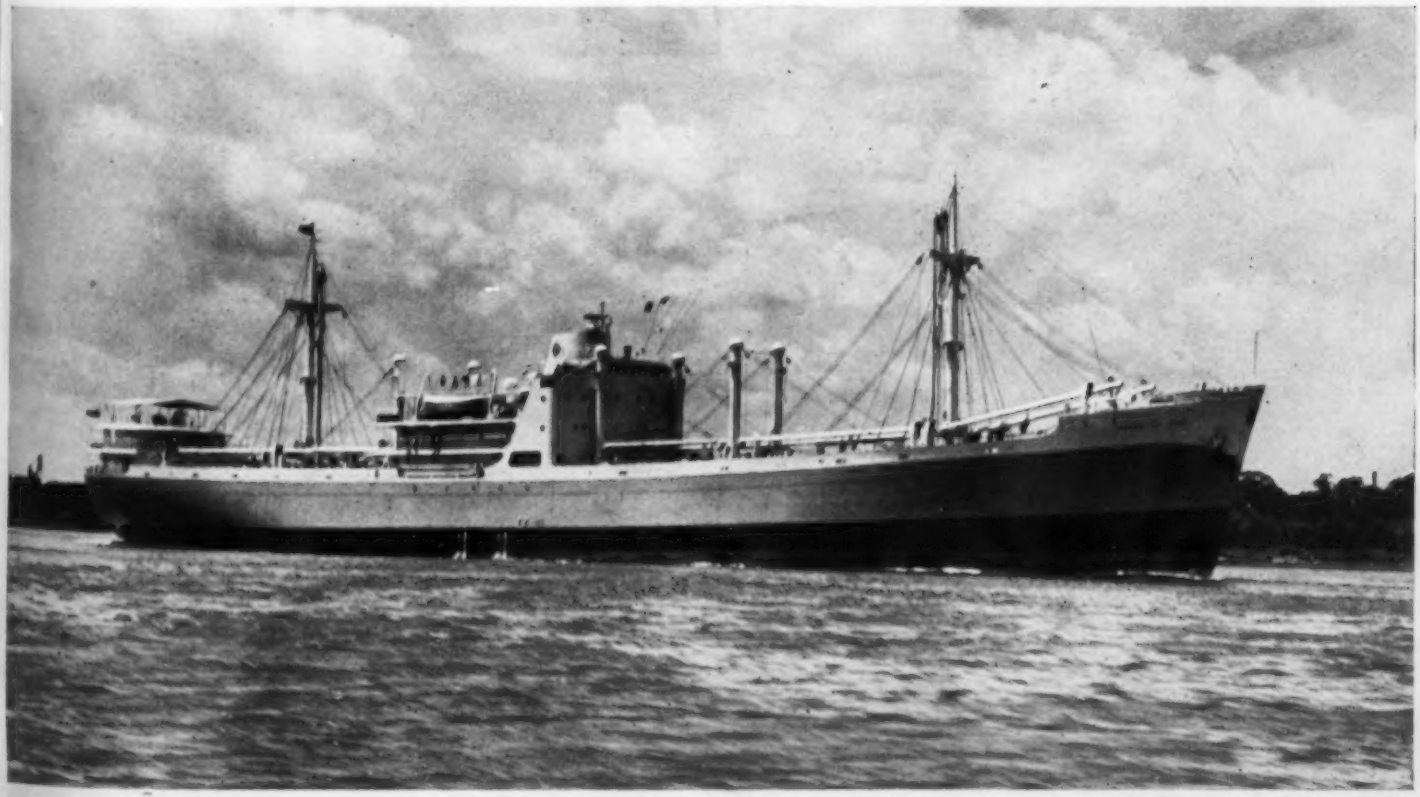
During the years 1947-48 the Canadian shipbuilder had high hopes of the tonnage replacement plan, the purpose of which was to enable

THE SHIPBUILDING INDUSTRY IN CANADA
Average Monthly Employment

	Geographical Areas				
Year	Pacific Coast	Great Lakes	St. Lawrence	Atlantic Coast	Totals
1946	4,988	2,148	6,272	2,991	16,399
1947	4,119	1,485	8,874	2,657	17,135
1948	2,949	2,308	8,045	1,976	15,278
1949	1,496	2,168	4,230	1,937	9,831
1950	1,100	2,202	3,892	1,336	8,530
1951	2,080	2,803	5,237	1,913	12,033
1952	2,595	3,591	8,092	2,909	17,187
1953	2,547	3,082	10,490	3,511	19,630

Concentrated in one ship can be found workmen representative of all trades necessary to build and equip a powerhouse, a radio station, and a modern hotel.

M.V. Ciudad de Cali—*one of four 5,900-ton cargo vessels built in 1953 for export to South America.*



Canadian shipowners of "ex-Park" ships to sell these vessels with transfer of flag, using the proceeds of sale to obtain replacements. It was felt that the plan should provide long-term employment for Canadian shipyards.

The anticipated demand for Canadian-built, ocean-going cargo ships did not materialize and by 1949 average monthly employment had reached a post-war low of 9,831 men; in fact in the month of December, employment dropped to 7,774 men.

To assist in the preservation of a nucleus of employment in the shipyards a plan of co-ordination of shipbuilding orders for departments and agencies of government was adopted. The Canadian Maritime Commission was charged by the Government with the duty of co-ordinating such requirements and making its recommendation with respect to the allocation of the contracts.

In 1948 serious consideration was given to a modest naval shipbuilding program as an educational order for Canadian shipyards. In 1949 orders were placed for three destroyer escorts, four minesweepers, one icebreaker and one gate vessel. This did not mean immediate work for the shipyards but it did give assurance that a planned program of naval work would guarantee the maintenance of a nucleus of supervisory staff and skilled labour for some years to come.

This destroyer escort and minesweeper program is the most ambitious, from a design and manufacturing point of view, ever undertaken in Canada, the ultimate goal being that both vessels will be one hundred per cent Canadian manufacture. No faint heart could have undertaken such a task. The job is well under way. All credit is due to the small group of technical officers at Naval Headquarters who, by their stubbornness and tenacity of purpose refused to consider anything but the best in machinery and equipment.

In 1950 eighteen additional naval vessels were allocated and provided for four destroyer escorts, ten minesweepers and four gate vessels. During 1951 additional orders for seven destroyer escorts were placed in Canadian

Davie Shipbuilding Limited, Lauzon, Quebec, showing (left) a ship fitting out, (centre) construction on the building ways, and (right) ships in the graving dock.

yards. Today, 1954, the total naval shipbuilding program calls for fourteen destroyer escorts, twenty-one minesweepers, one icebreaker and five gate vessels, not to mention a considerable number of smaller vessels and auxiliary craft.

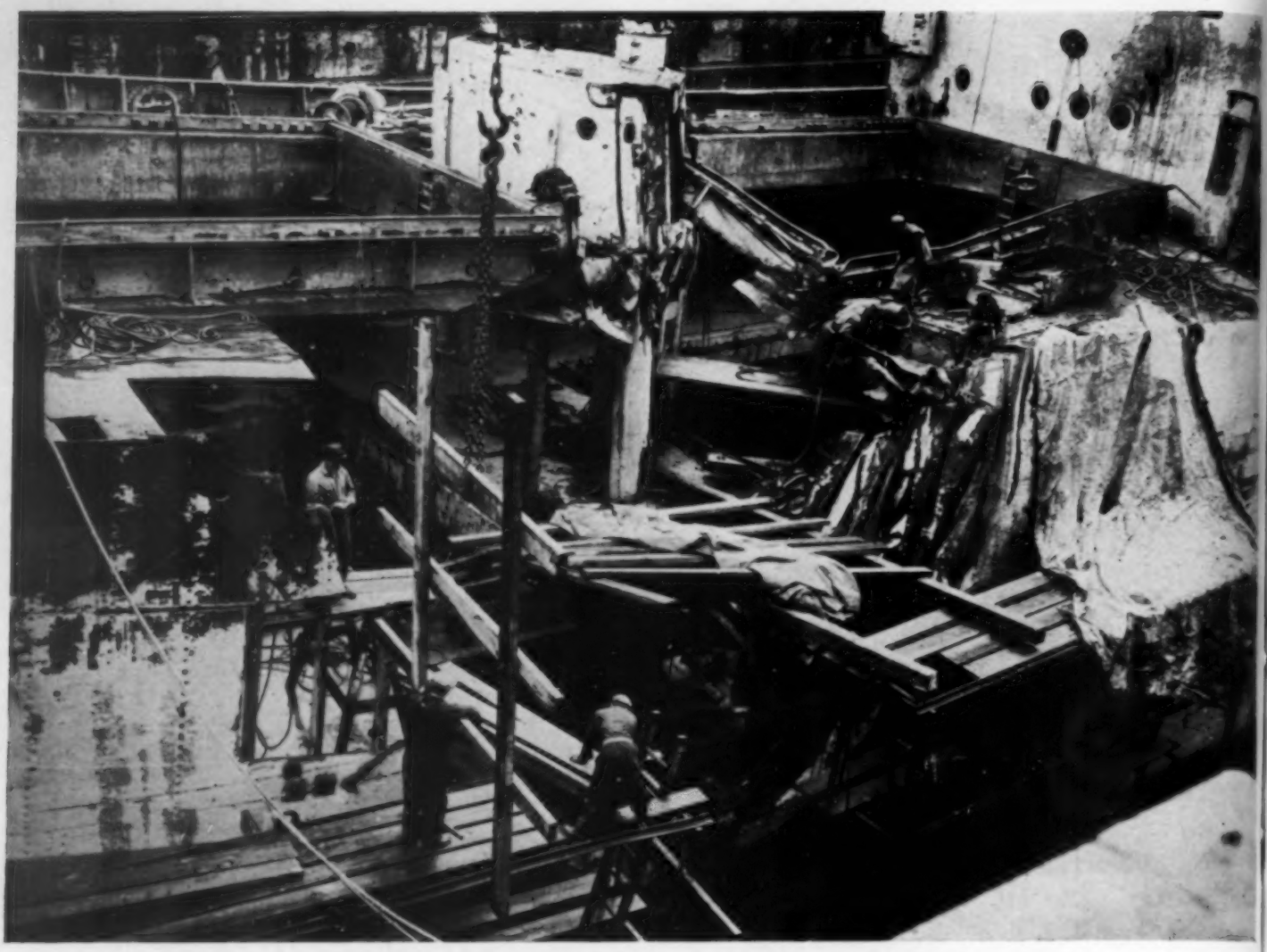
While the coastal and St. Lawrence shipyards were benefiting by the naval program, the Great Lakes yards were enjoying a boom in building large lake tankers and "upper lakers". During the years 1946-53, 191,086 gross tons of merchant shipping were completed and put in service. In the spring of 1954 the largest upper laker ever built in Canada will ply the upper Lakes. This vessel, the *T. R. McLagan*, has a length of 715 feet, a beam of 70 feet, a draft of 25 feet 1½ inches and a deadweight carrying capacity of 22,790 tons.

Reviewing the shipbuilding output of Canadian yards during the past forty years the record shows that on six occasions only did the annual gross tonnage delivered exceed 100,000. These were the years 1919, 1942 to 1945 inclusive and 1948. With the exception of 1948, all were wartime shipbuilding years.

Taking the twenty-year period, 1914-1933, average annual gross tonnage amounted to 24,819 tons. For the period, 1934-1953, the comparative figure was 156,635 gross tons. (Vessels over 500 gross tons only.)

Since it is becoming more difficult to obtain orders for export shipbuilding due to competition from British and European yards, it would appear that Canadian shipyards must depend on a continuing naval program and new tonnage for the Great Lakes and coastal trades if they are to continue to maintain fully integrated organizations of design and technical forces, yard personnel and facilities capable of expansion in an emergency.

H.M.C.S. **Prestonian** *— a former River Class Frigate modernized in 1953 for anti-submarine duties*

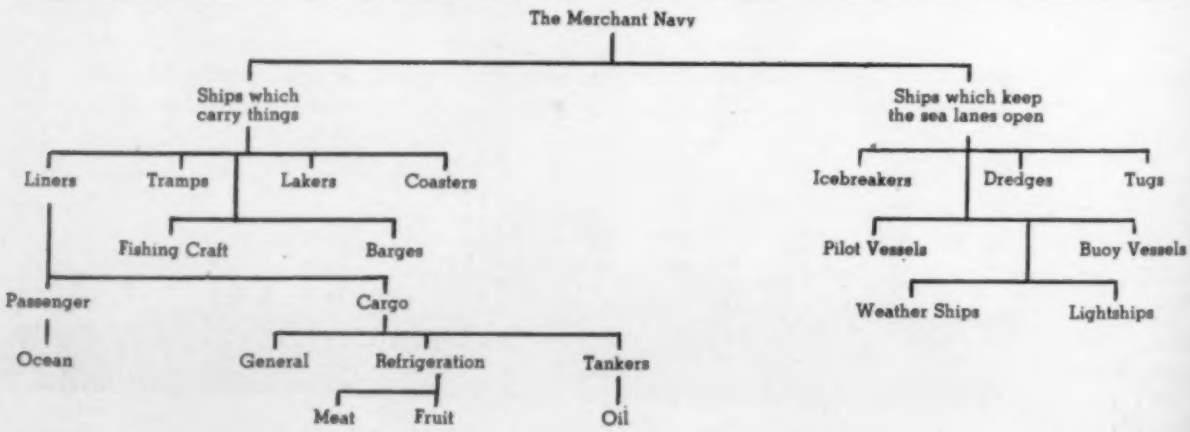


Repairs and reconstruction are a vital part of the industry.

Unlike most British and European shipyards which are concentrated in areas not too far distant from each other, Canada has an employment problem due to the geographical location of the strategic areas which must be served by ship-repair yards and drydocks.

The shores of Canada front on three oceans, the Atlantic, the Arctic and the Pacific. Moreover the mighty St. Lawrence River and the Great Lakes chain reach into the very heart of the Dominion, a distance of twenty-three hundred miles.

To take care of the needs of international sea transport and the coastal trade, shipyards and drydocks must be maintained in the Maritimes, the St. Lawrence area, the Great Lakes and the West Coast. This is an important consideration and one which can so easily be overlooked when considering a nucleus of a shipbuilding industry. In actual fact nuclei



Marine Industries Limited, Sorel, Quebec, showing the largest marine railway in the world.

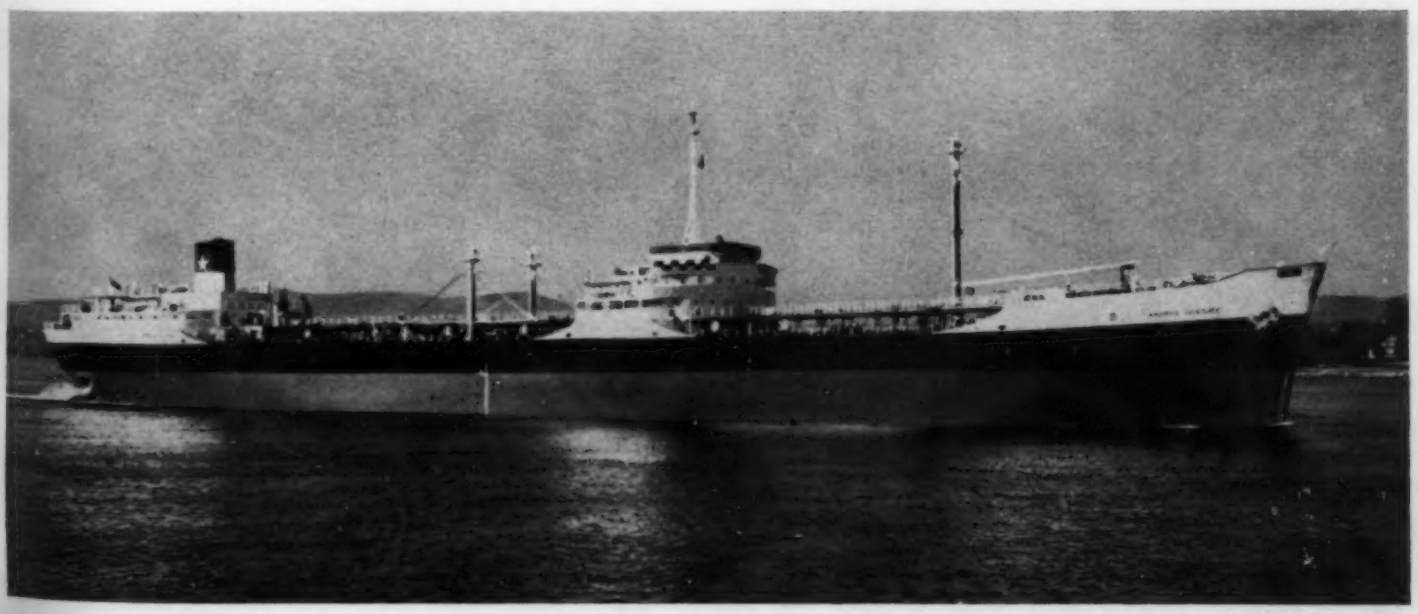
should be maintained in four separate and distinct areas for commercial purposes and reasons of national defence. What this manpower should be is a matter of conjecture. It is a healthy sign for the industry that few can agree on an acceptable figure.

Since shipbuilding and shipping go hand in hand, table A has been included to give the reader an idea of the number and types of ships on Canadian registry.

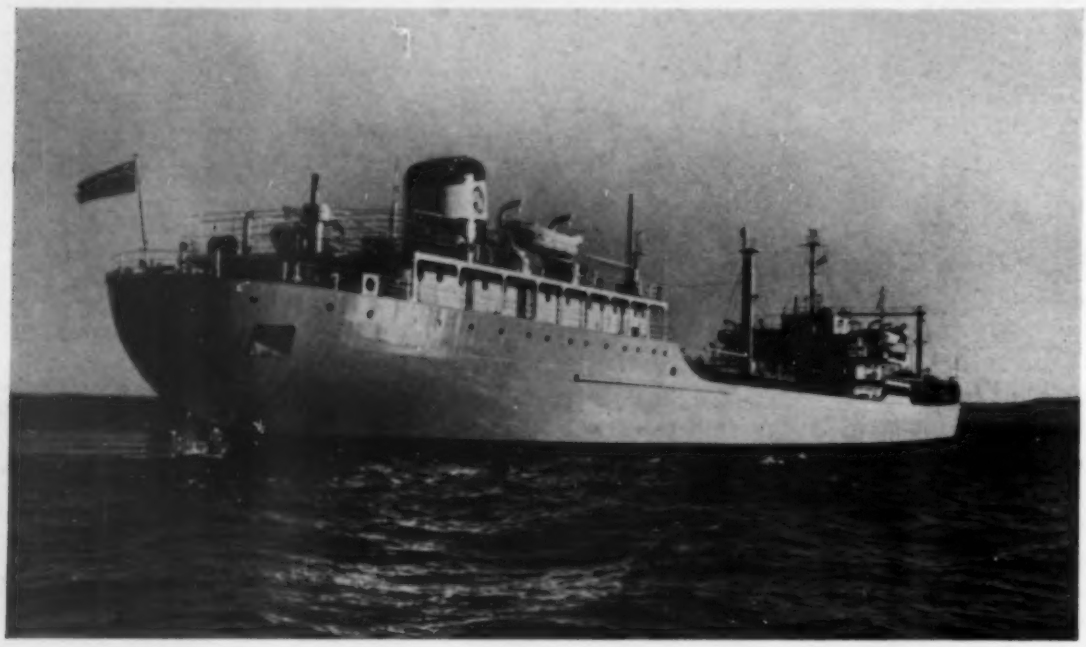
Unlike naval vessels which can be distinguished by their class, it is not always practicable to give merchant ships exact classification. Broadly speaking, however, they can be broken down into two types: (1) ships that carry things, and (2) ships that keep the sea lanes open.

The subject of ships and shipbuilding always poses the question, is Canada sea minded? Apart from the Maritimes and British Columbia, the answer would appear to be no. Such an attitude towards things maritime is understandable when one considers that there must be thousands upon thousands of Canadians who have lived and died and yet never had the good fortune to carry with them the memory of the muffled roll of the waves or the tang of the salt sea spray of an ocean storm.

S.S. **Andros Venture**—*a 28,000-ton ocean-going oil tanker built in 1953.*



Burrard Dry Dock Company Limited—shipyard at North Vancouver, B.C.



S.S. **B A Peerless**—*an oil tanker of 12,638 gross tons built in 1952 for service on the upper Lakes.*

Port Arthur Shipbuilding Company Limited at the head of the Great Lakes, 2,000 miles from the open sea.

H.M.C.S. Labrador *—latest addition to Canada's Navy, in the Marine Industries Ltd. shipyards at Sorel. Built by Marine Industries, she is an arctic patrol vessel and the largest and most complicated naval vessel ever built in Canada. She was commissioned at Sorel on July 8th.*

M.V. Kingcome*—a 242-ton steel tug built in 1952 for service on the Pacific coast.*

M.V. Irvingwood*—a canal-size pulpwood carrier of 2,353 gross tons built in 1952.*

An early drawing of Nanaimo, Vancouver Island, about 1860, when it became the centre of the coal-mining industry on the island.

The Century Old Bastion at Nanaimo

by MABEL E. JORDON

A SYMBOL of stability, this old bastion still stands conspicuously overlooking the harbour at Nanaimo, Vancouver Island. It is the sole remaining feature of a fort established by the Hudson's Bay Company in 1852-3 as a defence for settlers against recalcitrant Indians, and is the only building of its kind still standing in Canada.

In 1850 coal had been found nearby. Two years later the Hudson's Bay Company decided to mine the coal and dispatched one of its officers, Mr. Joseph W. McKay, to formally take possession for the company. His instructions were contained in the following historic letter, written by James Douglas, Chief Factor for the Company on the Pacific, and it is regarded in Nanaimo today as the first charter of the city. It reads:

"Fort Victoria,
August 24, 1852.

"Mr. Joseph McKay—

"Sir,—You will proceed with all proper diligence to Wentuhuysen Inlet, commonly known as Nanymo Bay, and formally take possession of the coal-beds lately discovered there for and on behalf of the Hudson's Bay Company.

"2. You will give due notice of that proceeding to the masters of all vessels arriving there, and you will forbid all persons to work the coal either directly or indirectly through the Indians or other parties employed for that purpose, except under the authority of a licence from the Hudson's Bay Company.

"3. You will require from such persons as may be duly licensed to work coal by the Hudson's Bay Company security for the payment of a royalty of 2s. 6d. a ton, which you will levy on the spot upon all coal whether procured by mining or by purchase from the natives, the same to be held by you and from time to time duly accounted for.

"In the event of any breach or evasion of these regulations you will immediately take measures to communicate intelligence of the same to me.

"I remain, sir, your obedient servant,
"James Douglas."

McKay proceeded to Nanaimo where the necessary buildings to house his men were erected. Expert fort-builders, notably Leon Labine and Jean Baptiste Fortier, were employed to prepare the timbers and build the fort. It was completed the following year. The little settlement was threatened several times when native tribes engaged in warfare. As late as 1858 it became necessary to man the bastion and fire shots towards a camp of Haidas who were on one of their southern excursions.

It was thus that Nanaimo became the centre of the coal mining industry on Vancouver Island and contributed largely to the settlement and prosperity of the Colony. The building of the Esquimalt and Nanaimo Railway was a direct result of the establishment of this industry. This was undertaken by Robert Dunsmuir in 1883 and was completed in 1886, the last spike being driven by Sir John A. Macdonald. The line was sold to the Canadian Pacific Railway in 1905.

Today Nanaimo is a thriving city of some 23,000 inhabitants, no longer dependent upon coal due to the extensive use of fuel oil by ships and trains. But its favourable situation and harbour facilities make it a central distributing point for the Island. Progress has brought new industries to the area; lumbering, deep sea fishing, and farming.

The old bastion is now maintained as a museum by the Nanaimo Post of the Native Sons of British Columbia, and houses many relics of those early days, as well as pictures of civic leaders. It is a source of historic interest to tourists whose financial generosity assists the commendable efforts of the Native Sons.

Selected Bibliography

"Historical Background of British Columbia"
by T. A. Rickard, ex-President of B.C. Historical Assn.

"History of British Columbia"
by E. O. S. Scholefield and F. W. Howay.

Canadian Pacific Annual Report, 1905, 7.

The Hudson's Bay Company bastion at Nanaimo, now maintained as a museum. When the fort was established Vancouver Island was a Crown Colony administered by the Company.

B.C. Government photograph.

Drawing by the Swedish Lap Johan Turi, showing Laps moving with their reindeer. The full-grown antlers of the reindeer in the upper part of the drawing show that the Laps are moving to their winter camp. The first of the three caravans shown below has just crossed the valley of a small river; it is spring, for the reindeer have small, new-grown antlers. Each 'raide' is led by a man or woman, and each reindeer carries a pack of household goods; children ride astride some while others carry babies strapped in their 'kumse' or canoe-like cradles. The last reindeer in the 'raide' is dragging tentpoles.

From Johan Turi: Muittalus Samid Birra.
By permission of Emilie Demant

Land Use in the Arctic—Part II

by A. E. PORSILD

Reindeer grazing: the winter range

Lichens grow in a great many different habitats and are adapted to widely varying climatic conditions; and their geographical as well as vertical range is very considerable. All boreal and arctic species are capable of enduring prolonged and intense desiccation as well as extreme ranges in temperature. Most commonly lichens grow on soil, rocks or on the bark of trees, but they may also grow on decaying wood, on the top of mesophytic mosses, on the thallus of other species or even on sun bleached bones. According to the substratum on which they grow, lichens are said to be terricoline, saxicoline, corticoline or muscicoline. Those most useful as forage plants for reindeer nearly all belong in the first category, although species of *Alectoria* growing from the branches of trees are of some importance. Nearly all lichens are light-loving and develop poorly or not at all in shade. For their growth they require, besides light, moisture and heat. Their very small mineral content may be derived in part from the substratum or more likely from air-borne dust, but their principal food comes from assimilation and photosynthesis of the carbon dioxide of the air.

As previously mentioned the terricoline species of lichens require a protective snow cover in winter; for this reason lichen range is

best developed on sheltered slopes and in not too moist depressions. On the open tundra where the competition from grass-like and other herbaceous plants is keen, the lichens most often grow on the sides of hummocks. In open park-like forest, near the edge of the forest, almost pure stands of lichen mats frequently form the ground cover. Rarely does one species alone form extensive colonies; most often several species grow together, mixed with true mosses such as *Sphagnum* and *Polytrichum*. Often a handful of lichens, picked at random, may contain half a dozen or more closely entwined species.

On low and fairly moist tundra, and in the lower foothills, the predominant species are often *Cladonia sylvatica* and *Cl. rangiferina*, frequently mixed with small amounts of *Cl. alpestris*, *Alectoria ochroleuca*, *Dactylina arctica*, *Cetraria islandica*, and others. On higher ground with favourable exposure and shelter *Cladonia alpestris* is often the dominant species, whereas on more exposed and wind-swept ridges *Cetraria nivalis*, *Alectoria ochroleuca* and *A. nigricans* predominate. Other species of frequent occurrence are: *Cladonia gracilis*, *Cl. crispata*, *Cl. amaurocraea*, *Cl. uncialis*, *Cl. delessertii*, *Cl. decorticata* and *Cl. squamosa*, *Cetraria cucullata* and *C. Tilesii*, *Stereocaulon tomentosum*, *S. paschale* and *Thamnolia vermicularis*, *Nephroma arctica*, *Dactylina arctica* and *Sphaerophorus globosus*. All these, and many more, are eaten by the reindeer but only a few of them are really important. A brief description of three of the most important species, commonly referred to by the inclusive term: "reindeer moss", may be appropriate: *Cladonia alpestris*, when fully developed is usually 3 to 4 inches long but under most favourable conditions may reach 8 or even 10 inches in length. The growth is terminal and apical and the lower part of the plant dies off and slowly decays. The colour is light grey with a yellowish-green tinge which is most noticeable when wet. The plant is dense and coral-like and richly branched, with no clear differentiation between stems and branches; the latter are round in cross section and hollow, often joined or fused together, forming small, hemispherical, cupola-like clusters so that, seen from above, the lichen mat may resemble masses of eggs spread on the ground. *Cladonia rangiferina* and *Cl. sylvatica* attain a similar size and are of a similar structure, but differ from *Cl. alpestris* by their less branched growth. Also the tips of the branches are more forked than spreading, often claw-like and the branches do not re-join above the first fork. While structurally alike, the last two are easily distinguished by their colour. Thus, *Cladonia rangiferina* is of a darker grey, often somewhat brownish, with a purplish tinge when wet, whereas *Cl. sylvatica* is pale grey or yellowish, with a greenish tinge when wet.

The summer range

Late in March or in early April when the backbone of the winter has been broken and the days are getting long, reindeer herds begin to move toward the summer range. The does are now heavy with fawn, and before the first young are born in late April, the deer men must select a suitable fawning place, generally in the foothills adjacent to the summer range. The fawning place must be well sheltered, for even in April blizzards may occur, and not infrequently does the night temperature drop to thirty degrees below zero. Also, there must be abundant forage of lichen and browse, so that, during the two months spent at the fawning grounds, the does and young fawns need not travel far to feed. On the fawning grounds the males and steers are separated from the does and are generally held in a separate herd close by.

From the fawning place the reindeer herds move slowly onto the summer pasture. By mid-June most of the snow will have disappeared from the low tundra which, however, is still very wet. But most of the larger lakes are still ice covered and the herds can cross at will, keeping to the higher and dry ground between lakes.

From the end of June to mid-August is the height of the fly season on the tundra, when, on calm and hot days, mosquitoes and gnats make life unbearable for the reindeer as well as for the men who tend them. On such days it is important that places can be found on sand points or headlands near the sea-shore, or on high bluffs or hills where cool breezes or fog

from the sea provide some relief against these pests. The first to arrive are the mosquitoes followed in July and August by the blackflies or gnats. About this time the larvae of the reindeer warble fly (*Oedemagena tarandi*) and the nostril fly (*Cephenomyia nasalis*) that were dropped already in June on the fawning grounds, have emerged from their pupal stage and now overtake and torment the reindeer.

For the summer pasture, country of low relief is desirable. The ground should not be too dry or stony because, otherwise, the reindeer are liable to foot injury. Nor should it be so wet as to cause foot diseases such as foot-rot and dermatitis. However, if open herding is practised, little injury to the reindeer need result from these causes.

On the summer range the food of the reindeer consists largely of the grasses, sedges and other herbaceous perennials of the arctic tundra to which, depending on the type of range, may be added the young leaves and twigs of willow and dwarf shrubs and a variable amount of lichen. The lichen is not necessary for the reindeer on the summer range, but is readily eaten when moist. In addition, all kinds of fleshy fungi are devoured greedily by the reindeer, as are the eggs and young of birds nesting on the tundra, as well as the young of lemming and other microtine species of the tundra. This seemingly abnormal carnivorous habit of the reindeer, together with their apparent fondness for gnawing bones and the tips of shed antlers is, perhaps, due to a craving for salt developed during the winter away from the sea-coast. On the summer pasture reindeer are often seen to be feeding on halophytic sea-shore plants and kelp, and even to be drinking sea water.

Although the reindeer on the summer pasture do not show any pronounced or clearly marked preference for definite species, they do avoid coarse vegetation and appear to seek out and nibble only the most tender and young shoots. In their grazing habits they resemble horses more than sheep or cattle. Reindeer do not bite off the vegetation down to the roots but in a day's grazing wander over a considerable area of pasture, nibbling a few leaves of tender grass here and the young shoots of a willow there. For this reason, the vegetation on rather wet and soft pasture suffers more from their trampling hoofs than from their actual grazing. But whereas the continued trampling of a reindeer herd within an enclosed pasture quickly destroys the forage and soon also the complete turf, the overall effect produced by the mechanical "tilling" of grazing reindeer on the summer pasture is beneficial rather than otherwise. It is true that lichens suffer and in time disappear; and that a number of species, especially woody plants, may become stunted under continued browsing. Grasses and sedges, on the other hand, as well as a number of other perennial herbaceous plants, benefit and increase by the continued "tilling" of grazing reindeer. Most of the tundra plants reproduce vegetatively as well as from seed. Consequently, by good management, which involves rotation cropping, summer reindeer pasture will recover from grazing and even improve in quality.

Lap-style winter camp made of grass sods over a frame of spruce poles, in the fashion of an Indian tipi.

Winter reindeer range in black spruce muskeg east of the Mackenzie delta in northern Canada. The ground is covered with a thick carpet of reindeer "moss" which furnishes the bulk of winter feed.

On the coast summer range of Alaska, Palmer (1926) has estimated that the palatability of the forage cover averages about 62%. True mosses undoubtedly constitute a considerably larger percentage of the unpalatable species than the 4% he has assigned to them. Among other non-palatable species are such coarse and tough plants as the lyme grass (*Elymus*) and most species of rushes (*Juncus*). As far as is known no arctic or subarctic plants are poisonous to reindeer. In Alaska even water hemlock (*Cicuta*), elsewhere poisonous to livestock, is said to be palatable.

Although reindeer on the summer range eat a great variety of range plants, only a comparatively small number, because of their palatability and greater abundance, are of primary importance. On the coast range of Alaska, Yukon and northwestern Mackenzie some of the more important forage species are: cotton grass (*Eriophorum vaginatum*), willow (*Salix* spp.), dwarf birch (*Betula glandulosa*) reindeer "moss" (*Cladonia* spp), horsetail (*Equisetum arvense*), sedge (*Carex* spp), nearly all grasses including *Arctagrostis*, *Poa*, *Dupontia*, *Festuca*, *Alopecurus*, *Puccinellia* and others, fernweed (*Pedicularis* spp.) lupine (*Lupinus arcticus*), sour-dock (*Rumex arcticus*), bilberry (*Vaccinium uliginosum*), sage (*Artemisia* spp.) and fireweed (*Epilobium latifolium* and *E. angustifolium.*)

During the migration from the summer range back to the winter range the reindeer again gradually return to their winter diet of browse and lichen. During this period they are often seen nibbling the mature seed pods and the ripened fruiting inflorescences of grasses and sedges. It is during the late summer and autumn that the reindeer put on their back fat.

Close-up of dense carpet of reindeer "moss" (Cladonia alpestris) on reindeer winter range.

Carrying capacity of reindeer pasture

Range studies and controlled grazing experiments which have been carried out in Alaska (Palmer, 1926, 1929, and 1934) and in northwestern Canada (Porsild, 1929, 1936, 1936a, 1942 and 1947) have shown that the arctic tundra and taiga of North America is capable of a sustained yield for reindeer that, on a per acre basis, is comparable or superior to that of short-grass sheep- or cattle-range of the western United States and Canada. Thus Palmer found that, on average tundra-coast range in Alaska, the minimum year-long grazing area required for each adult reindeer is 33 acres. On this basis he (1929) gives the following seasonal land use:

Spring and early summer (2½ months)	4 acres
Summer (2 months)	2 acres
Autumn and early winter (4 months)	10 acres
Winter (3½ months)	17 acres

This, however, is a minimum, and for most parts of Alaska, he recommends from 40 to 60 acres per head for year-long grazing. Because the lichen plant is so easily destroyed by mechanical injury, and because it grows at such a slow rate, the winter range with its all important constituent of "reindeer moss" is the first to suffer from overgrazing or from poor range management. When reindeer were first introduced into Alaska, the immediate coastal areas contained a considerable cover of lichens (Jackson, 1893). In these areas lichens have now largely disappeared, owing, probably, to the close confinement of the herds to the coast. The new cover consists almost entirely of herbaceous and shrubby vegetation — sedges, low species of browse, and grasses. On some other ranges similar changes due to grazing and fire may be expected — changes that on the whole will probably prove beneficial to summer pasturage but detrimental to the maintenance of winter forage (Palmer, 1929).

In Alaska, Palmer (1929) estimated that 300,000 square miles of tundra and sparsely timbered land was suitable and available for

Canadian reindeer summer range beyond the tree-line.

Left:—On the fawning grounds near the Mackenzie delta the first fawns are born in late April when the temperature at night may drop to 30° below zero. Fawns in foreground were born only a few hours previously.

Right:—Reindeer teams leaving the Reindeer Depot on the East Branch of the Mackenzie delta.

reindeer grazing, and that, based on year-long grazing requirements of from 40 to 60 acres per animal, this area was capable of supporting indefinitely 4,000,000 reindeer. In the coast section between Bristol Bay and Point Barrow, where the maximum development of the industry occurred, there was, according to Palmer, room for 1,000,000 reindeer. In 1926, the official estimate of the total number of reindeer maintained there was 350,000. There is reason to believe, however, that this figure, based in part on estimated increases, was too high, and that the largest number reached before the general decline of the industry set in could not have been over 250,000. Although the decline of the reindeer in Alaska was due largely to causes other than depletion of the grazing range, it seems probable, in view of later developments, that the earlier estimates were too optimistic and that the total carrying capacity of all available reindeer grazing land in Alaska certainly would not be in excess of 1,000,000 head.

The arctic tundra and taiga of Canada has been the home of vast numbers of caribou since it was first explored and probably ever since the retreat of the great ice sheet that once covered the land. These caribou generally spend the winter in or near the edge of the forest and in summer migrate north into the open tundra. Until about 30 years ago large numbers of caribou from the continent each spring crossed the ice-bound sea to spend the summer on the larger islands of the Arctic Archipelago, probably to avoid the clouds of mosquitoes and gnats that tormented them on the mainland. Untold generations of Indians and Eskimo have depended on them for a large part of their food and clothing, and it appears that until the introduction of modern firearms a balance had been established between the natural increase of the animals on the one hand and the combined human and wolf predation on the other. With the coming of the white man this equilibrium was soon disturbed, and while there still are large herds of caribou left in the Canadian

Reindeer are herded by Eskimos in this round-up in the Canadian Western Arctic.
Dept. of Northern Affairs and National Resources

Caribou, essential to the welfare of many Eskimos and Indians, in the Northwest Territories of Canada.
Dept. of Northern Affairs and National Resources

tundra and taiga, considerable alarm has been felt over the reported decreases. Judging from his personal observation and from the reports of earlier travellers, Seton (1912) estimated the northern caribou population at 20,000,000, while more conservative observers have placed the probable number at between 1,000,000 and 2,500,000. In the light of recent information obtained from the use of aircraft and aerial photography, personal interrogation, and other sources, it would seem that while perhaps the earlier estimates greatly exaggerated the numbers that could possibly have subsisted in the Canadian North, there is, nevertheless, abundant evidence that the caribou are rapidly decreasing in numbers and that the present caribou population of continental Northwest Territories may not be over 670,000, (Banfield, 1950).

In 1919, a Royal Commission was appointed to report upon the possibilities of reindeer and musk-ox industries in arctic and subarctic parts of Canada as a practical means to preserve Canada's northern wildlife resources and, at the same time, to provide and develop new sources of food, clothing, and livelihood for Canadian Eskimos and Indians. The Commission recommended (1922) the establishment of experimental herds of reindeer in selected locations in the Canadian North; the exact location of the experiments to be determined by a general botanical reconnaissance which was to have special reference to reindeer pasture, carrying capacity and other general conditions of importance to a future reindeer industry.

In 1927-28 the writer was placed in charge of a detailed survey of the grazing possibilities of the treeless country along the Arctic Coast, from the Alaska-Yukon boundary east to the Coppermine River, and south to the north shore of Great Bear Lake. (Porsild, 1929). Following the investigation, arrangements were at once made by the Dominion Government for the purchase of a herd of reindeer from Alaska, to be delivered to a selected area lying immediately east of the delta of the Mackenzie River. In March, 1935, delivery was made of a herd of 2,370 head of reindeer to the Government corral near Kittigazuit. During 1931-1935 the grazing studies were continued in the country east of the Mackenzie Delta, where, in 1935, a tract of land of approximately 6,600 square miles was set aside as the Mackenzie Delta Reindeer Grazing Reserve. In 1930 a similar grazing survey had been undertaken in central Keewatin.

These investigations demonstrated that in

the Mackenzie District two areas, formerly densely populated by caribou, were eminently suitable for the maintenance of domesticated reindeer. The carrying capacity of an area adjacent to the Mackenzie Delta was estimated to be at least 250,000 head of reindeer whereas a much larger, and physiographically rather different area north and east of Great Bear Lake was estimated to be able to support 300,000 head (Porsild, 1929). When the original survey was made this whole region was practically unmapped. Accurate maps, based on aerial surveys have since disclosed that in this region more than half of the land surface is occupied by lakes and ponds. In view of the much higher ratio of water to land, the writer's original estimates of the carrying capacity should be reduced proportionately.

In 1947, the writer again examined the summer and winter grazing range in the Mackenzie Delta Reserve. An area of approximately 800 square miles of upland tundra adjacent to the main reindeer station had been grazed each winter, during the preceding 12 years, by a herd of approximately 5,000 reindeer. Examination of this range, together with ungrazed control areas, indicated that during the 12-year period no more than one third of the potential winter pasture within this area had been utilized and that the remainder had been left almost completely untouched. A small area of approximately 57 square miles, in close proximity to the station, showed slight evidence of overgrazing, whereas the rest was quite unimpaired and capable of providing winter grazing indefinitely for a herd of 5,000 reindeer (Porsild, 1947).

From these observations it would appear that under conditions such as those described above practically no damage results from winter grazing, provided that the range is not used until the ground is frozen and covered by snow. The reason for this is that when grazing over the frozen lichen carpet, the reindeer merely nibble the tips of the plants. The tips of the branches are the only parts of the lichen plant that are capable of growth, and when lightly grazed, are able to regenerate in a few years; furthermore, "holes" plucked into the lichen carpet by grazing, quickly fill in by lateral growth and expansion of the lichen mass.

On the other hand, if the entire upper layer of the lichen carpet is destroyed by grazing or trampling, regeneration ceases or, at best, is very slow. Also, when this happens, other plants such as dwarf shrubs, lichens and grasses, or true mosses, compete for the space formerly occupied by the lichens.

Available information indicates that the carrying capacity of reindeer range in arctic Europe and Asia are similar or at least comparable to that of North America. Thus, in the Anadyr Province of eastern Siberia, which physiographically is comparable to northwestern Alaska, Russian investigators have found that one adult reindeer for 8 months of year-long winter grazing requires the following pasture:

Forest tundra	21 acres
Scrubby tundra	23 acres
Non-scrubby tundra	42 acres

whereas on the summer range 20 acres are needed for each adult deer for a 4-month period when the daily requirements of green herbage was found to be about 40 lb. (Vassiliev, 1936; Druri, 1936).

Nutritive content of lichen

In the mountain districts of Norway, and perhaps elsewhere, lichens have long been harvested regularly and fed with native hay to cattle, sheep, goats, pigs and horses; fish meal is generally added to make up for the low protein and fat content of the lichen. Isaachsen (1917) reported that the water content of lichen (*Cladonia* spp.) varies under natural conditions from 56 to 80% but when air-dried sinks to 15-18%. In the latter condition the lichen contains about 2.5% protein, — roughly about one third of that in wild hay — and an equal amount of fat, whereas raw lichen of 65% water content averages 0.65% digestible pro-

Musk-oxen on Devon Island.
National Museum of Canada

When their owners are travelling overland in summer, Eskimo dogs often carry packs weighing up to 45 lb.

tein, 0.6% fat, 12% carbohydrate and 8.5% cellulose. Isaachsen further stated that 6.5 kilo of raw lichen equals in food value 1 kilo barley or 2.5 kilo wild hay, whereas in air-dried condition (15-18% water content) it approximately equals wild hay.

Palmer (1934) quotes somewhat higher nutritive values derived from samples of lichens collected in the interior of Alaska, but, as neither he nor Isaachsen state the method of analyses, their figures are not directly comparable.

Musk-oxen

The musk-ox is adapted to life under extreme arctic conditions to an even higher degree than the caribou and reindeer. At one period this animal ranged over the greater portion of the northern half of the North American Continent, but in modern times its range has been greatly reduced. From time to time musk-ox calves have been successfully reared in large zoological gardens, and since 1930 the United States Fish and Wildlife Service in Alaska has conducted an experiment with East Greenland musk-oxen with a view to re-establish the species there. Thus far the experiment has shown that musk-oxen can indeed be bred in captivity, but that they increase very slowly. Consequently any attempt to domesticate the animals, or to raise them commercially, would seem to have little hope of success. They have responded well, on the other hand, to complete protection, both on the Canadian mainland and in the islands of the Arctic Archipelago.

Conclusion

In the Northern Hemisphere that vast tract of land lying north of the boreal forest or taiga, variously known as Arctic Tundra, Barren Grounds, Northern Plains or Arctic Prairie, everywhere is sparsely populated, and from the point of view of either fur production or grazing, whether by game animals or by domesticated animals such as reindeer, is among the least productive land areas in the world.

In the U.S.S.R. Voshchinin (1932) estimated that 1,150,000 square miles of arctic tundra and 2,350,000 square miles of taiga was unsuited to agriculture. In North America all but a small portion of the million and a half square miles that comprise the Northwest Territories and Yukon, likewise is wasteland from the point of view of the agriculturist, as are also the northern and northwestern parts of Alaska.

In the Old World the wild caribou that once roamed the tundra and the northern taiga have long ago disappeared from most of its former range, and in some areas have been replaced by domesticated reindeer. No reliable figures are available giving the area that today is utilized by reindeer. Balzak, Vasyutin and Feigin (1949), however, state that "by the end of the Second Five Year Plan there were 1,800,000 reindeer in the U.S.S.R.", and on their map (fig. 65) they show that the greatest concentration is in the tundra area between the White Sea and the River Ob, and in eastern Siberia east of the Kolyma River; the map also shows that the southern limit of reindeer breeding extends far south of the treeless tundra. Unfortunately, no information is given by them as to the number of people in the U.S.S.R. who depend on reindeer for a living. Perhaps the most reliable information is supplied by Mecking (1928) who estimated that "In the Arctic fringe, the total population is probably hardly more than 30,000. This population is made up of Lapps, Samoyeds, Ostyaks, Dolgans, Tunguses, Yakuts, Yukagirs, Aleuts, Koryaks and Chukchis". Most of these, with the exception of the Aleuts, at least formerly were reindeer nomads.

In Alaska the northern tundra and taiga once was inhabited by large herds of wild caribou that, in a large measure, contributed to the native economy. But even before the turn of the century these herds had all but disappeared, and reindeer were introduced into Alaska in order to provide food and clothing for the Eskimo. On mountain ranges of the interior, the caribou held out longer than on the coast, but even there the last remnants of the once numerous caribou population are fast disappearing (Lantis, 1950).

Colby (1937) estimated that from 13,000 to 15,000 natives of Alaska, including dependents,

Some Greenlanders still prefer the old-style winter house in which the outer walls are made of sods and flat stones. All members of the family help in the building and, meantime, live in a tent. Jette Bang

rely on reindeer as an essential source of food and clothing. This figure, even in 1937, may have been an overestimation. At present, at any rate, the dependence on reindeer is very much smaller for, according to Lantis (l.c.), there are today only 27,920 reindeer in Alaska.

According to the 1951 census, the total Eskimo population of Canada was 9,493 while, according to the same census, the native population of the Northwest Territories comprised 6,857 Eskimos and a somewhat smaller number of Indians. Only a few hundred Eskimos and Indians of the Mackenzie Delta area are directly or indirectly dependent on the reindeer industry, which, in Canada with a total of only 7,500 reindeer, is still largely in the experimental stage.

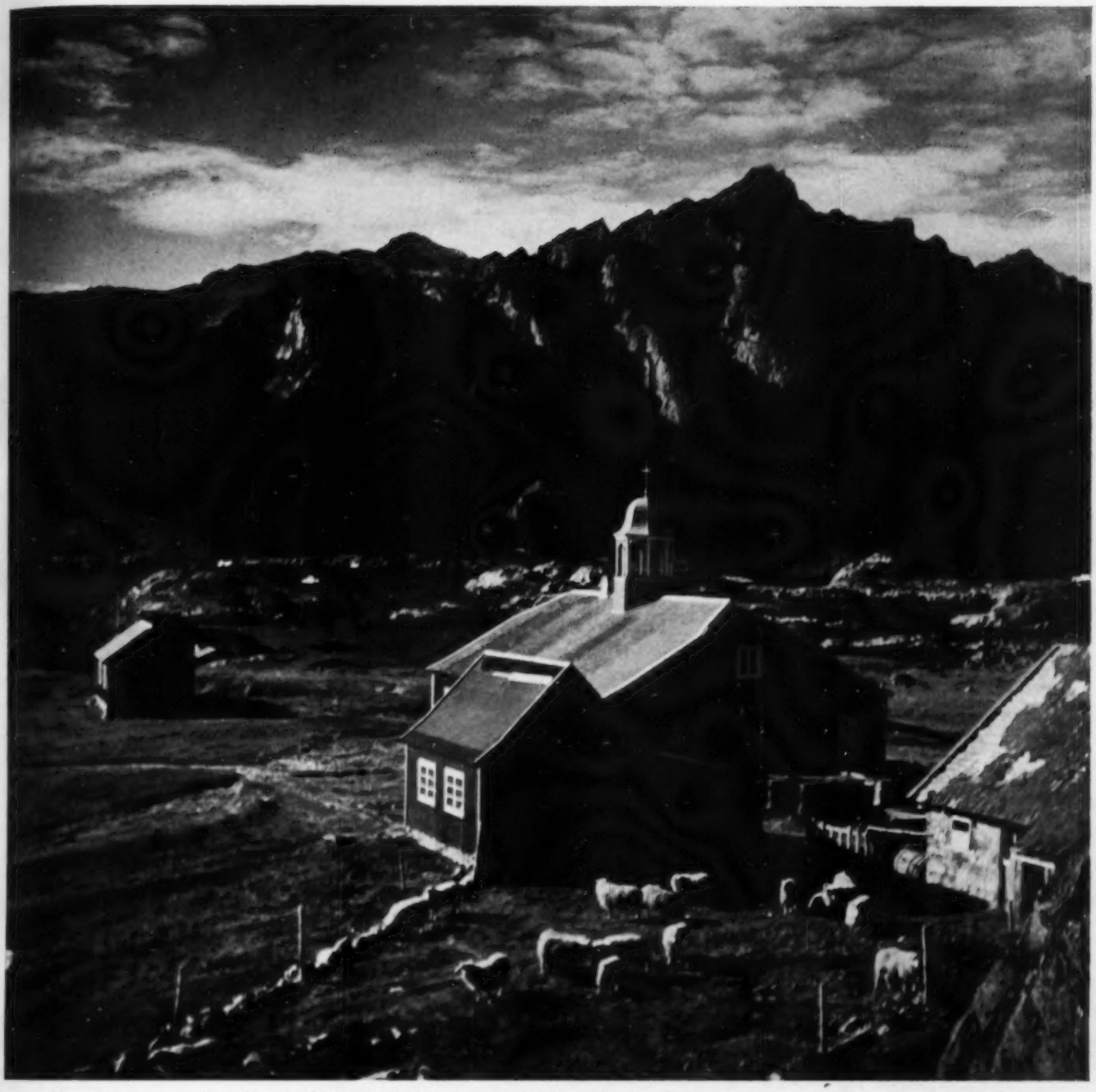
In some sections of the Canadian North, wild caribou are still plentiful, although much reduced in numbers. Banfield (1950) estimated that, on the Canadian mainland, in an area of 600,000 square miles of tundra and taiga, caribou is one of the basic factors in the economy of approximately 20,000 Canadians.

In Canada, the musk-oxen, not long ago threatened by extinction, now enjoy complete and year-long protection. As a result they are again increasing and slowly re-occupying former range.

There are, today, large areas in northern Canada that, although well suited to domesticated reindeer, are no longer occupied by caribou. Probably more than 1,000,000 head of reindeer could be successfully maintained there, provided that native or white herders could be found who were willing to live the strenuous and hard life of a reindeer herder. But for efficient management, one million reindeer would have to be divided into at least 500 units, each requiring about 10 herders for its proper care. There are, however, today only slightly more than 9,000 Eskimo in all of Canada, and only a few of them live in areas that are suitable for reindeer. There are, to be sure, much larger numbers of Indians; but Indians are forest dwellers, and by temperament and tradition are even less inclined than are the Eskimo, to give up their traditional hunting habits and freedom, in order to settle down to the monotonous drudgery of reindeer herding. Also, as with the Eskimo, the idea of owning and caring for property is quite foreign, and can only be acquired slowly and by degrees.

Of the 22,000 native inhabitants of Greenland, only a few hundred are today directly engaged in sheep farming; however, most of the products from the sheep industry are used in the country and in this manner benefit a considerably larger number of Greenlanders. In the fiord district of the west coast caribou were once numerous, and until the middle of the last century provided an important source of food and clothing. Thus, in the years between 1820 and 1830 Rink (1857) estimated the annual take at 37,000. As elsewhere in the Arctic, the introduction of firearms seriously depleted the stock. In recent years regulation of the hunting appears to have checked the decline, so that for a number of years the remaining herds are said to have been holding their own.

Some writers have, from time to time, been impressed by the economic potentialities of the vast arctic tundra and taiga. They have, no doubt, reasoned that the untold millions of acres of arctic tundra or grassland that at one time supported vast numbers of wild caribou as well as immense herds of musk-oxen, if restocked with domesticated reindeer or musk-oxen could again be made productive, thereby furnishing substantial sources of food for the meat-hungry world. At first glance this line of reasoning would seem logical, for have we not here two large, meat-producing animals that are admirably suited to life in the Arctic, require no barns or stables to shelter them through the long arctic winter, and are able to subsist, summer and winter, on native arctic vegetation that, without cost or effort to the owners of the reindeer, reproduces itself year-in and year-out? Unfortunately, experience has shown that the musk-ox does not lend itself readily to domestication, and that the raising of reindeer on a commercial scale is not yet practicable. The reason for this is neither that the reindeer is unsuitable as a large-scale meat producer, nor that the arctic tundra vegetation will not feed it, but simply that there are not enough people in the thinly populated Arctic who are willing and satisfied to live the life of reindeer nomads; nor can the commercial



View from the old village of Frederiksdal, south of Julianehaab, the centre of the sheep farming and fishing district of southernmost Greenland. Jette Bang

raising and herding of reindeer, owing to the high cost of marketing as well as to climatic and social disadvantages, be made attractive enough economically to induce sufficient numbers of people from elsewhere to go and live in the Arctic as reindeer herders. Nansen (1914) well realized this for, when speaking of the decline of the Samoyeds, he said: "This decline of the nomads is all the more to be regretted, as they alone with their [reindeer] culture are able to turn to account the immense wastes of the tundra; the white race will never learn to do it."

In Canada the most promising and economically practical approach to the problem of utilization of the vast arctic and subarctic tundra and taiga appears then to be the wise and careful administration of the remaining wildlife resources. If given adequate protection against wanton slaughter and against needless destruction of their natural range, caribou and musk-oxen will both respond, and in the end may be safely counted upon to provide a dependable and lasting source of food and clothing for the sparsely populated Arctic.

For references see page V

Aerial view of Royal Military College, Kingston, Ontario. In foreground is Fort Frederick, built 1846.

The Canadian Army Today

by COLONEL C. P. STACEY

THE CANADIAN ARMY has played a great part in its country's history—a greater part than many Canadians understand. In 1954 it occupies a more important position in the national life than ever before. For the first time, Canada is now maintaining a large regular army in time of peace. Through that army and her other armed forces she is protecting her own safety in an uncertain world; she is also contributing to the collective security of the western nations.

In the spring of 1954 the strength of the Canadian Army Active Force—the regular army—reached 50,000 officers and men. This is an extraordinary contrast with the days before the Second World War. Then Canada's Permanent Force numbered only 4,000 men. Its historic regiments carried on their colours honours won on many battlefields, but in peacetime they were mere skeletons, quite incapable of taking the field effectively at short notice. Today, instead of the three weak battalions of 1939, Canada's regular infantry numbers fifteen battalions well up to strength. Four of them belong to the new Regiment of Canadian Guards recently authorized by Her Majesty the Queen. Two are battalions of The Royal Canadian Regiment, which has served its country since 1883. Two belong to Princess Patricia's Canadian Light Infantry, and three to

the Royal 22e Régiment—famous units formed in the fire of the First World War. And two each come from regiments which, though new to the regular force, have distinguished records going back nearly a century in the country's citizen army, now called once more the Militia —The Queen's Own Rifles of Canada and The Black Watch (Royal Highland Regiment) of Canada.

The two celebrated regular cavalry regiments of pre-war days, The Royal Canadian Dragoons and Lord Strathcona's Horse (Royal Canadians), still exist, but now they are armoured units riding Centurion tanks instead of horses. There has been a great increase in the regular artillery, the oldest of Canada's regular corps, which dates from 1871; its "field branch" today comprises four mechanized regiments of the Royal Canadian Horse Artillery, a contrast with the single weak "brigade" (as the term then was) of 1939. There has been a parallel expansion in the other corps of the Army—the Engineers, the Signals, and the administrative "services" whose importance has grown so markedly with the advance of technology and mechanization.

Before 1939 units of the Canadian Army were never seen abroad in peacetime, except on such ceremonial occasions as Coronations. Today there is a Canadian infantry brigade group in the Far East and another in Germany. Within Canada the tasks of the Army have taken on a variety unknown in earlier days. It works in areas that never knew it before. In particular, it has taught itself to operate in the far North, a region to which changes in the international situation have lent a new significance. Every year since the Second World War has witnessed arduous exercises, usually conducted in close co-operation with the R.C.A.F., in the Arctic or sub-Arctic. As long ago as 1923 the Army began to operate the Northwest Territories and Yukon Radio System (the earliest of its northern enterprises); since 1946 it has maintained the Alaska Highway.

The increase in the size of Canada's regular army is the result of her experience in the Second World War and of the international tensions which have existed since that war ended. After 1945, though the country's wartime forces were largely disbanded, the services were not reduced to ineffectiveness as had been done after 1918. The Canadian people had clearly decided that peace was unlikely to be secure unless there were some organized forces to protect it. The plan for the post-war Army adopted in 1946 contemplated maintaining a

At the Royal Canadian School of Signals at Vimy Barracks, near Kingston. Soldier apprentices in the modern hobby-shop during off-duty hours.

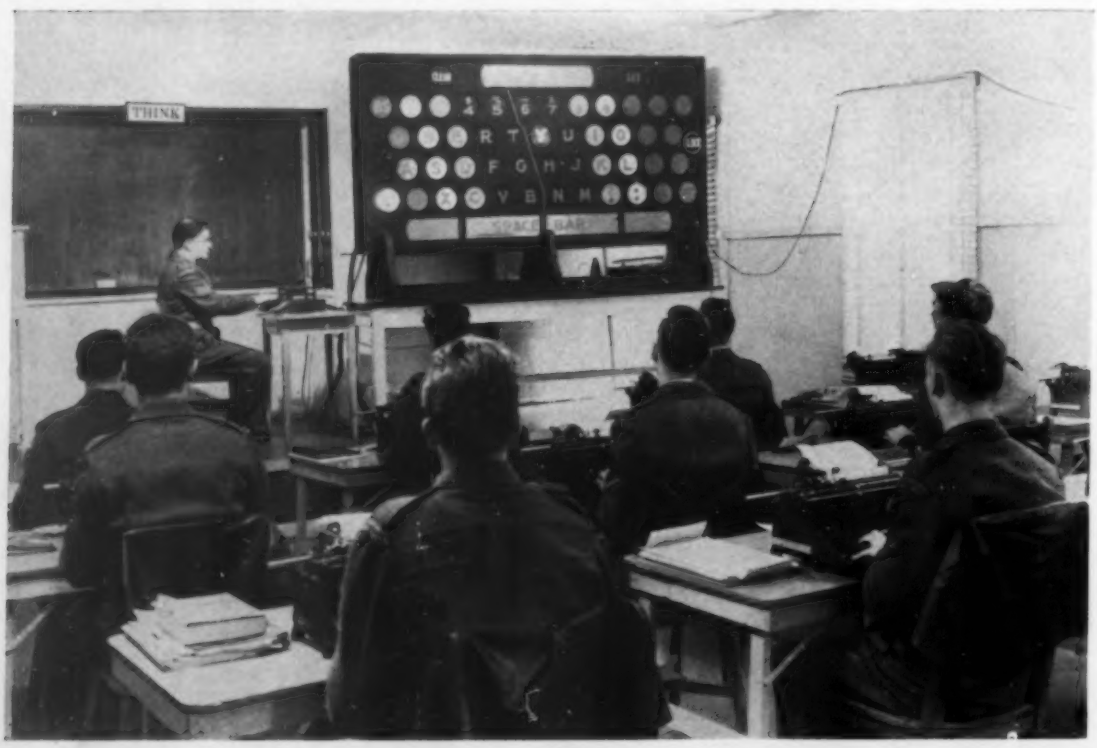
regular force of some 25,000 men, which would include a brigade group always ready for action in addition to headquarters staffs, training establishments, miscellaneous administrative units and officers and men to assist the Reserve Force. This plan was expanded under the pressure of circumstances. In 1949 Canada signed the North Atlantic Treaty, by which she and her associates bound themselves to "maintain and develop their individual and collective capacity to resist armed attack". The next year brought the Korean War; and Canada raised an infantry brigade group—basically, three battalions and an artillery regiment—and dispatched it to the Far East as the major part of her contribution to the United Nations' resistance to the Communist attack there. Another brigade group was raised in 1951 and sent to Europe to stand on guard as part of the integrated international force organized by NATO as a deterrent against aggression in that quarter of the world. Commitments like these can only be fulfilled by regular soldiers. The need for these forces abroad, plus that for an adequate defence at home, and the size of the administrative organization required under modern conditions to support these fighting units, are the explanation of our present relatively large establishment.

The Army's field force today comprises three major formations. The *1st Canadian Infantry Division*, the first regular division ever formed by this country in peacetime, was organized in the autumn of 1953. One of its three brigades is stationed in Germany, the others are in Canada. The Division's headquarters is at Petawawa, Ontario. The *25th Canadian Infantry Brigade Group* is in Korea. Finally, there is the Army component of the *Mobile Striking Force*, a force of three battalion groups intended specifically for defending Canada itself. As units complete a tour of duty at home, they become available for service in Europe or Korea.

The Army in Canada

The defence of Canada is not a question of merely providing against direct attack upon Canadian soil. As the Minister of National Defence, Mr. Claxton, has put it, "The right place to defend Canada and what Canadians believe in is as far away from Canada as possible". It is sound strategy to join with our allies abroad to contain potential aggressors on distant continents. Nevertheless, direct defence cannot be neglected, particularly in these days of long-range bombers and thermo-nuclear bombs; and in recent months it has been receiving more and more attention from the Canadian defence authorities, working in concert with those of the United States.

It is clear that under present conditions the most probable direction from which a threat to Canadian soil might come is the north; it is clear too that it would necessarily be, fundamentally, an air threat. Topography and climate rule out operations by large ground



A novel method of teaching "touch" typing. A sergeant instructor at the Royal Canadian Army Service Corps School at Camp Borden employs a new training aid with a class of beginners.

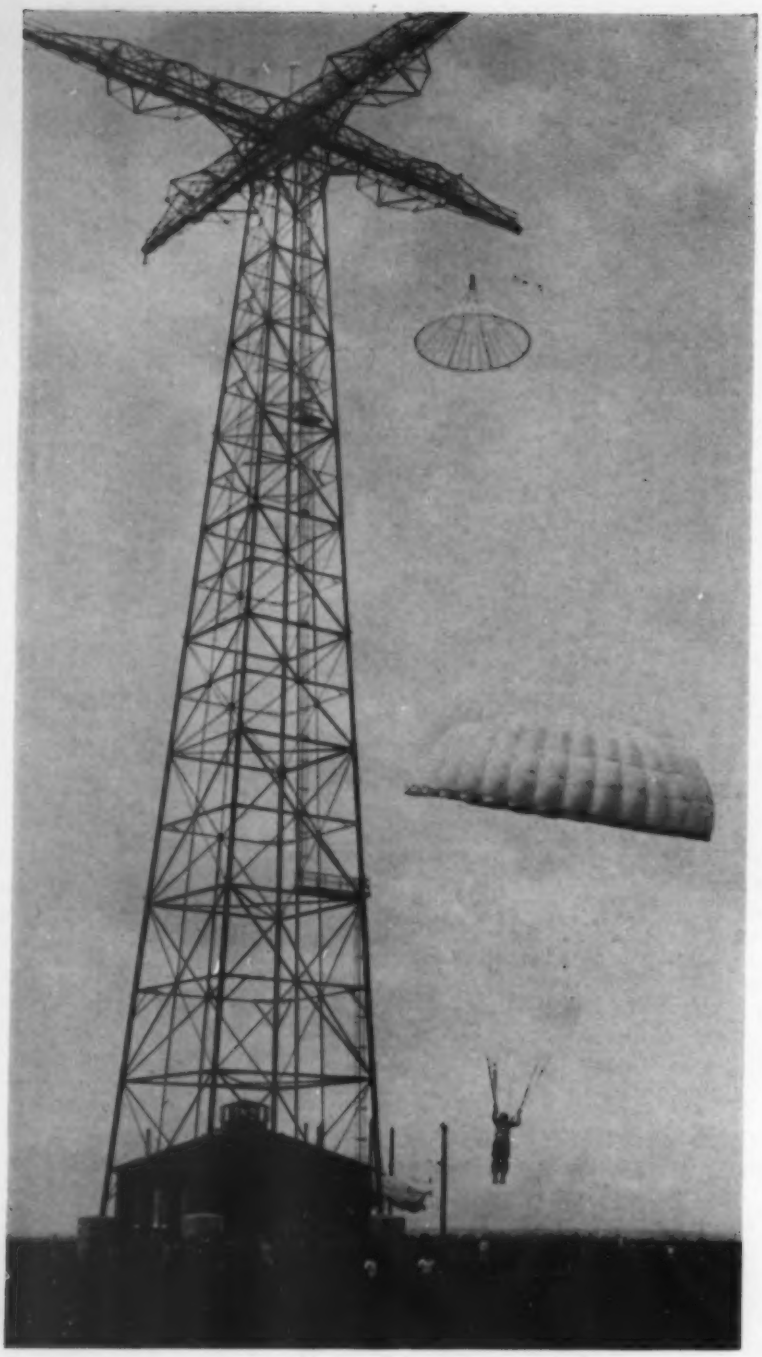
Graduation day at Collège Militaire Royal de St-Jean. The Hon. Brooke Claxton, Minister of National Defence, and President of the Collège, inspects cadets at the end of their first year.

forces in the Canadian northland. "Diversionary raids" are possible, but they could only be carried out by small army units transported and supplied by air. The defence of the North, then, is mainly an air problem, and the Army in this sphere must work very closely with the Royal Canadian Air Force. The Mobile Striking Force responsible for northern defence is a joint enterprise of the Army and the R.C.A.F.

The Army units of the Mobile Striking Force are specially trained in airborne operations. They are three parachute infantry battalions (drawn from The Royal Canadian Regiment, Princess Patricia's Canadian Light Infantry and the Royal 22e Régiment) and small airborne units of the Royal Canadian Artillery, the Royal Canadian Engineers, the Royal Canadian Corps of Signals, the Royal Canadian Army Service Corps and the Royal Canadian Army Medical Corps.

Airborne training begins at the Canadian Joint Air Training Centre, Rivers, Manitoba, which is operated jointly by the Navy, the Army and the Air Force. Here the men are trained as parachutists, the "jump course" lasting for one month. It concludes with five jumps from an aircraft, after which successful candidates receive their wings. The school also instructs in the techniques used in loading food, fuel, ammunition and heavy equipment in aircraft, and dropping them by parachute on selected areas. In addition, officers receive special training in the staff work involved in the planning and mounting of airborne operations.

With a view to their primary task, units of the Mobile Striking Force are also trained



Airborne training. The jump tower at Camp Shilo, Manitoba.

in Arctic warfare. At Fort Churchill, Manitoba, the Department of National Defence maintains a combined experimental and training station for Arctic operations. It is administered by the Army but serves all three Canadian fighting services and the Defence Research Board, in addition to assisting the United Kingdom and United States services. An Arctic Indoctrination Course held at Churchill teaches officers and men how to live, move and fight in the Arctic, both in winter and in summer. Clothing, tents, cookers and other equipment have been specially designed to meet the rigours of the Arctic climate, and soldiers employed there eat a special ration of high calorie content. On completion of the parachute training at Rivers and the course at Fort Churchill individuals are ready to take part with their units in northern exercises.

Such exercises, as we have said, have been characteristic features of Canadian Army winter training since the Second World War. Normally they involve and depend on R.C.A.F. cooperation on a large scale. Normally too the idea on which they are based is the destruction of an "enemy" airborne force assumed to have established itself on Canadian soil. Sometimes these exercises are international. Such a one was Exercise "Sweetbriar", held by Canadian and United States forces along the Northwest Highway (the official name of the Alaska Highway) in February 1950. Other exercises have been held in the valley of the Mackenzie River, in the Fort Churchill area and near Fort Chimo in Ungava. In February 1954 Exercise "Loup Garou" took place in a large area centring on Sept Iles, Quebec. All these were tactical exercises. A famous post-war non-tactical exercise, concerned with the problem of winter movement in the North, was "Musk-Ox", held in the early months of 1946. In it a convoy of army snowmobiles moved from Churchill to Edmonton by way of Cambridge Bay, Coppermine and Fort Norman, a route of about 3,000 miles, of which some 1,500 had never before been traversed by any vehicle.

Regular field units in Canada not forming part of the Mobile Striking Force carry on annual training programs which, passing through phases at home stations in which the individual soldier is trained to the required standard, and sub-units (companies, etc.) learn to operate as such, have culminated in "collective" training on a brigade basis. This takes place in suitable manoeuvre areas. One such is Camp Wainwright, Alberta. The summer of 1954 will see the first large-scale training conducted at the new establishment at Camp Gagetown, New Brunswick. The acquisition of Camp Gagetown is a particularly significant development, since it provides the Army for the first time with a training area

Heavy mortars of the 1st Field Regiment R.C.H.A. during Exercise "Sweetbriar".

large enough to permit a whole division to manoeuvre, and this in a region whose climate allows year-round field training.

The defence of Canada at large against air attack is the primary responsibility of the R.C.A.F. Anti-aircraft artillery, however, is the affair of the Army, and more specifically of the Army's Anti-Aircraft Command. Following a well-proved United Kingdom precedent, this command works under the operational control of the R.C.A.F.'s Air Defence Command, which directs all air defence operations in Canada.

The operations and training of the Army in Canada, both the Regular and Militia components, are directed, under the guidance of Army Headquarters, Ottawa, by five territorial Commands (each with subordinate areas) with headquarters at Edmonton, Winnipeg, Oakville (Ontario), Montreal and Halifax.

Student parachutists jump from a "mock-up" at the Joint Air School at Rivers, Manitoba.

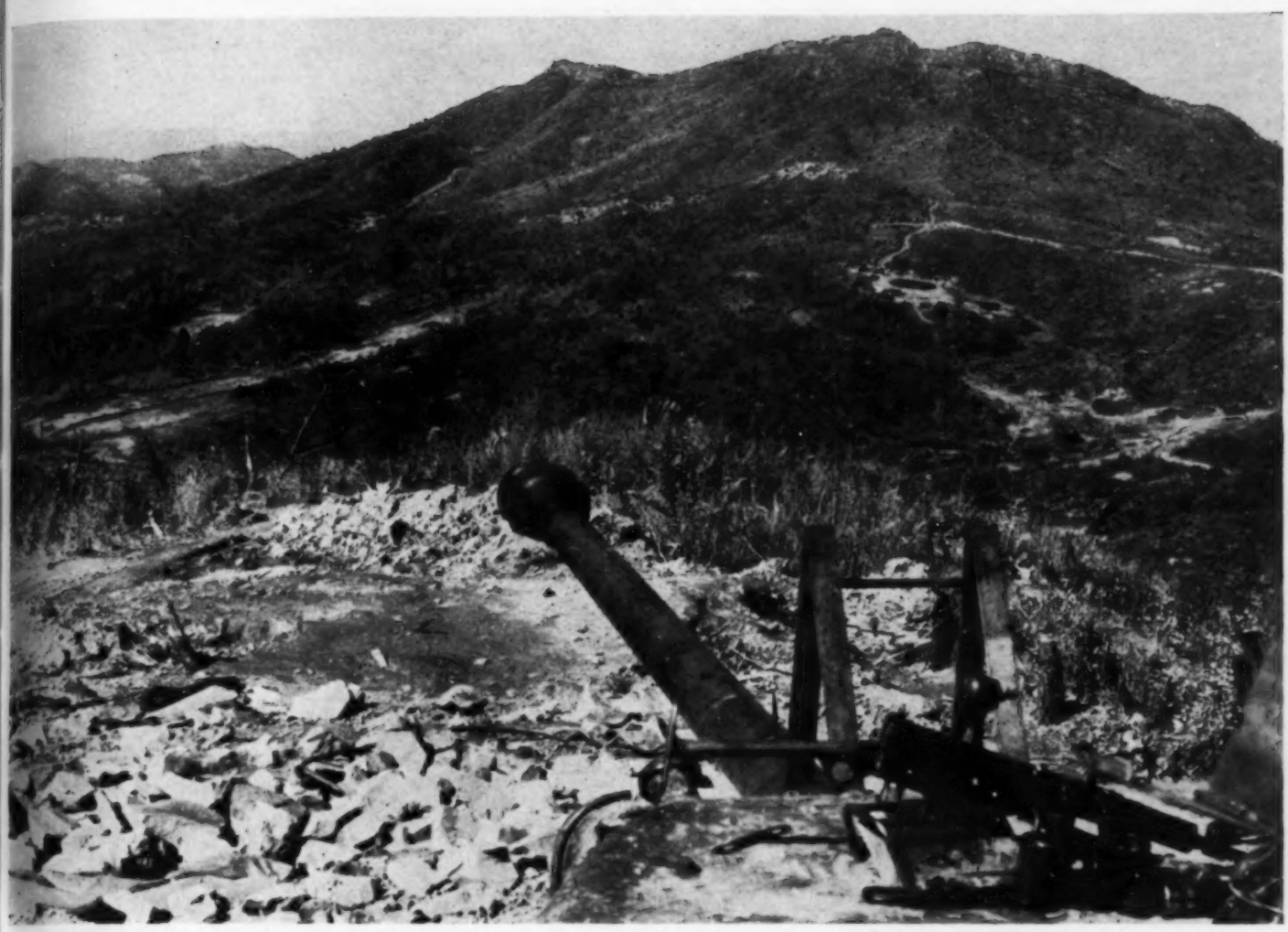
Action in Korea. Guns of the 2nd Regiment, Royal Canadian Horse Artillery, firing in support of Canadian Infantry, 21 June 1951.

The Army in the Far East

The armistice signed at Panmunjom, Korea, on 27 July 1953 brought to a belated end the third most costly overseas war in Canadian history. In it the Canadian Army suffered battle casualties of 1,543 all ranks, of which 309 were fatal.

The Canadian Army Special Force was raised in August 1950. From it the 25th Canadian Infantry Brigade was formed. In November 1950 the 2nd Battalion, Princess Patricia's Canadian Light Infantry went to Korea in advance of the rest of the Brigade. In April 1951 the battalion took part in a gallant defensive action near Kapyong, winning a citation from the President of the United States for its share in defeating the Chinese attempt then being made to engulf the United Nations forces. The remainder of the Brigade reached Korea in May 1951 and joined in the U.N. offensive of that month. In July of the same year the Canadian Brigade was incorporated in the 1st Commonwealth Division which was then formed, and a few months later it took part in advances that established the line held by the Division until the armistice. On this line the Canadians subsequently fought a number of bitter engagements, principally in the area of a dominant hill forty miles north of Seoul called "Point 355" or "Little Gibraltar". Here the 2nd Battalion, Royal 22e Régiment and the 1st Battalion, The Royal Canadian Regiment repelled strong local attacks in November 1951 and October 1952. In May 1953 The Royal Canadian Regiment's 3rd Battalion was involved in heavy defensive fighting farther to the west.

In common with other U.N. countries Canada adopted a policy of "rotating" its troops in Korea, changing major field units every year, and replacing individuals in base and line of communication units after one year's service. Completion of the third such rotation in May 1954 found the following

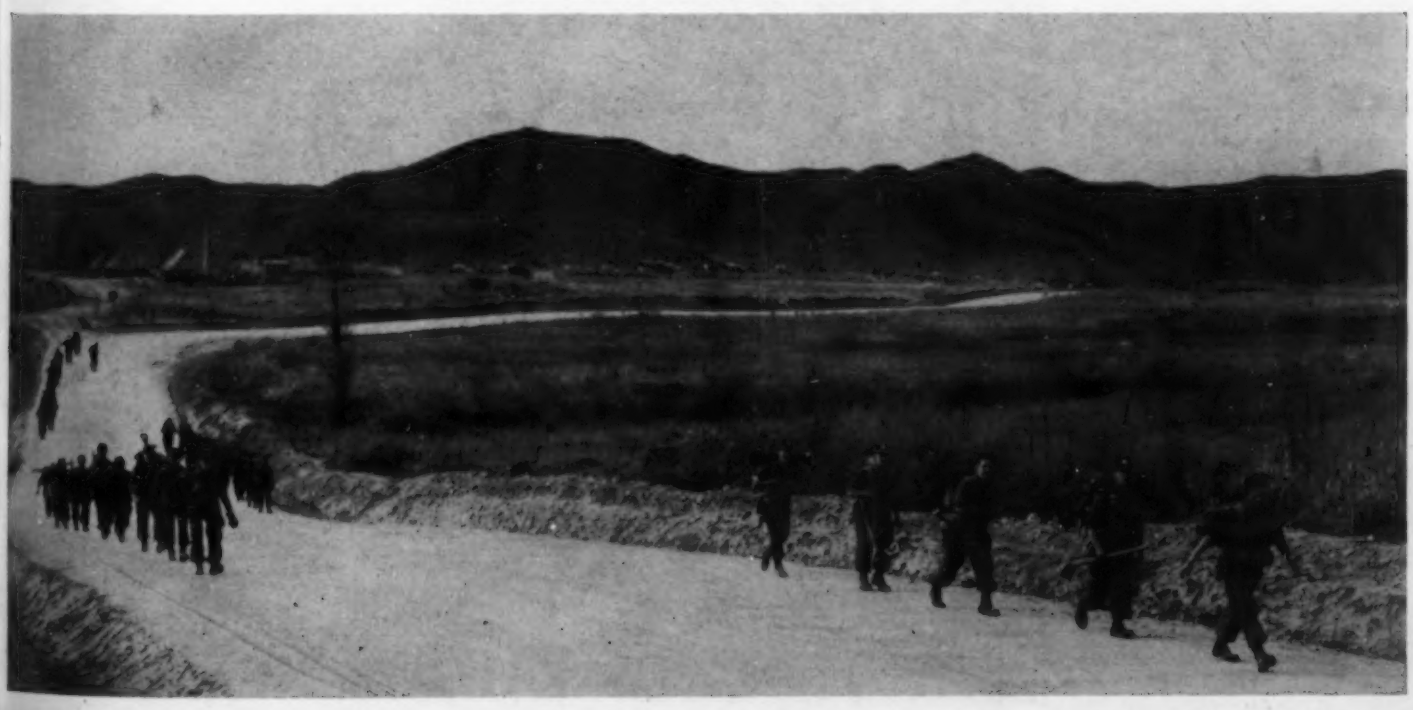


A Sherman tank of "B" Sqn. Lord Strathcona's Horse (Royal Canadians), faces "Little Gibraltar" (right), on a Korean battlefield.

armoured, artillery and infantry units in Korea: "D" Squadron, The Royal Canadian Dragoons; 3rd Regiment, Royal Canadian Horse Artillery; 4th Battalion, The Canadian Guards; 2nd Battalion, The Queen's Own Rifles of Canada; and 2nd Battalion, The Black Watch (Royal Highland Regiment) of Canada.

Since the armistice, the U.N. troops have continued to stand guard in Korea. The present task of the 25th Canadian Infantry Brigade is to watch over a sector of the

In Korea, members of The Royal Canadian Regiment move to new positions during a 1st Commonwealth Division exercise in November 1953.



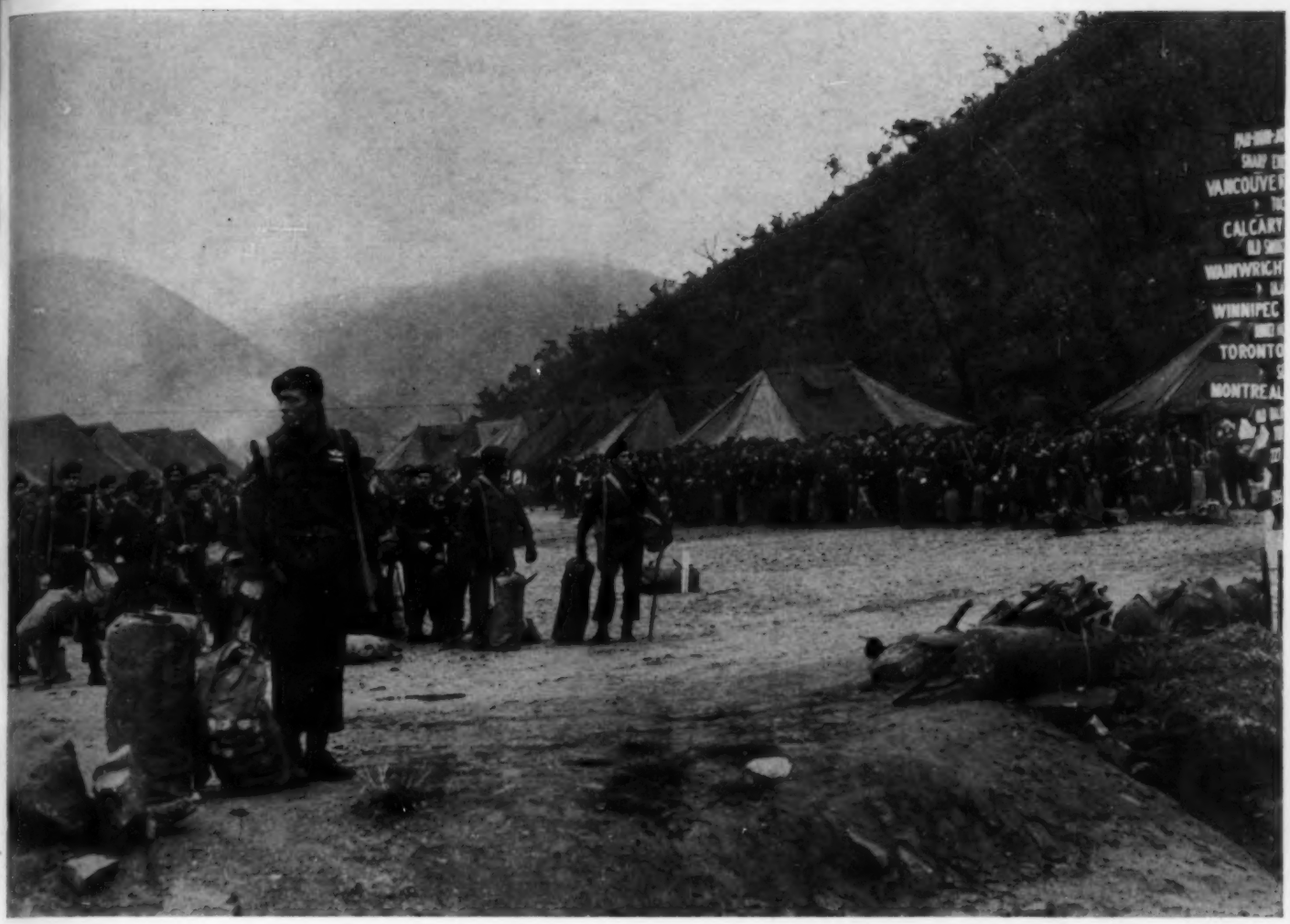
Left:—During his visit to the 25th Canadian Infantry Brigade Group in Korea in March, 1954, Prime Minister St. Laurent inspects a Guard of Honour provided by the 2nd Bn. The Black Watch (Royal Highland Regiment) of Canada.

Right:— Members of the 1st Bn. P.P.C.L.I. preparing to leave the Korean front in November 1952.

southern boundary of the demilitarized zone. The ground is roughly that over which the Canadians fought from late in 1951 up to the signing of the armistice. Shorn of every building, the area offered little or no shelter, and vigorous efforts have been made to provide better accommodation than the dugouts which were used during active operations. As a result, each unit area now presents an attractive appearance, resembling that of a small village of tents and prefabricated huts, complete with roads and paths neatly edged with white-washed rocks.

Although an active training program keeps all ranks busy, recreational facilities have had special attention. As in the case of accommoda-

Brigadier J. V. Allard (standing, right) and senior officers of the 25th Canadian Infantry Brigade Group at the official opening of "Radio Maple Leaf" in Korea in January 1954.



tion, local resources are almost non-existent; everything has to be brought in or constructed. A newly-built brigade recreation centre provides, among other facilities, tennis courts, a gymnasium, a handicraft shop, canteens, and an outdoor auditorium. Concert parties from Canada, the United Kingdom, Australia and New Zealand have furnished "live" entertainment, supplementing the regular program of current movies. "Radio Maple Leaf" broadcasts news bulletins, descriptions of sports events and recordings of popular Canadian radio programs. During their year of service in Korea Canadian troops are entitled to seven clear days' leave in Japan. They are flown to Japan and are quartered at Ebisu Camp on the outskirts of Tokyo. In the city itself, the Maple Leaf Club, administered by the Army and staffed by Canadian Red Cross girls, provides a shopping service, guided tours, and among other features a Canadian snack bar.

The Army in Europe

The Canadian Army, which won so much of its reputation on European battlefields, went back to Europe in 1951. In the spring of that year the 27th Canadian Infantry Brigade Group was raised, largely through the agency of Reserve Force units, to serve in the armies of the North Atlantic Treaty Organization. In the following autumn the units of the Brigade moved overseas, and on 21 November, in the principal square of Rotterdam, Mr. Claxton turned the formation over to General Eisenhower, then Supreme Allied Commander, Europe. It took up its station in the Hanover area of the British Zone of Germany, serving as part of the British Army of the Rhine. Thus for the first time in history a portion of the Canadian Army undertook peacetime garrison duty abroad.

During its two years of life the 27th Brigade Group overcame various inevitable "teething troubles" and acquired an enviable reputation for hard military efficiency. Then in the autumn of 1953, by which time all the personnel of the original brigade had been, or were being, "rotated" to Canada, it was replaced by the

Visit of Lt.-Gen. G. G. Simonds to the 27th Canadian Infantry Brigade Group in the spring of 1953. The Chief of the General Staff (left) examines a target after a rifle shoot on the ranges near Hanover in Germany.

1st Canadian Infantry Brigade Group, a part of the new 1st Canadian Division then being formed at home. At the same time there was a move to new quarters, in the Soest area on the edge of the Ruhr valley, ninety miles southwest of Hanover. Here, in four fine camps specially constructed for it, the 1st Brigade now lives and trains.

Canadian soldiers in Germany are surrounded by reminders of their country's military history, for the units' quarters in the various camps bear the names of eight famous forts across Canada from sea to sea. Brigade Headquarters and certain miscellaneous brigade units are quartered in Fort Henry in the Stockum area, five miles southeast of Soest. Fort York nearby houses The Royal Canadian Regiment's 2nd Battalion. Just outside Soest itself is Fort Chambly, where the various service units are stationed. The camp near Werl, eleven miles southwest of Soest, contains Fort Anne, now occupied by a squadron of Lord Strathcona's Horse (Royal Canadians), Fort Victoria, in which the engineer squadron is quartered, and Fort St. Louis, which houses, appropriately, the 2nd Battalion, Royal 22e Régiment. In the remaining camp, at Hemer, twenty miles southwest of Soest, Fort Prince of Wales and Fort McLeod accommodate respectively the 2nd Regiment, Royal Canadian Horse Artillery, and the 2nd Battalion, Princess Patricia's Canadian Light Infantry. The camps are both efficient and attractive. The ground is landscaped and roads are of concrete. The single-storey, white, concrete buildings are roofed with black slate. Each camp has up-to-date cinemas, gymnasiums, tennis courts and playing fields; and the completion of the artificial ice rinks now under construction will provide complete recreational and athletic facilities unequalled in any other Canadian military establishment.

One of the modern canteens built for Canadian troops in the Soest area.

The Brigade's training program is designed

Right:— A group under instruction at a Canadian camp near Hemer, in Germany.

The Rt. Hon. Louis S. St. Laurent arriving at Soest in February 1954. Greeting the Prime Minister are Gen. Sir Richard Gale (right), C.-in C. Northern Army group, and Brigadier W. A. B. Anderson, Commander of the 1st Canadian Infantry Brigade Group.

to produce a formation second to none. The facilities available are excellent. The unit areas provide everything necessary for individual and sub-unit training, and farther afield the British Army of the Rhine allocates to the Brigade special training areas, such as that at Soltau, north of Hanover, for more advanced and collective training. Here the troops participate in night and day "schemes" under conditions closely approximating those of actual warfare. The highlight of the Canadians' training each year since 1951 has been participation in the big exercises held by the NATO ground forces in Europe.

Maintaining the morale of troops in garrison in a foreign country is always something of a problem. In the case of the Canadian brigade it has had a great deal of attention. In addition to the camp "amenities" just mentioned, a generous leave policy has been maintained. Special low travel fares are available for all ranks, and Canadian troops can use the British Army Leave Centres which exist at many points of special interest in Germany. But the most important measure taken has been the provision made in 1953 enabling soldiers' families to join them in Europe at public expense. Married quarters are now being pushed to completion at the various camps. Originally, the European tour of duty for married men was one year, for unmarried ones two years. Under the new conditions, every officer and man will stay two years, and the brigade will be more efficient as a result.

Assault training in Germany. Canadian infantry cross a river during battle exercises at Sennelager.

Manning the Army

A large regular army can only be kept up to strength and a proper standard of efficiency by a constant intake of keen and well-educated young officers and young soldiers. The Army requires not only people of good general education but also professionally and technically trained people. During the past few years an efficient system has been developed to attract and train the young Canadians who are needed.

To provide the officers, the Army takes part in three schemes shared by all three armed services. One involves training university

A platoon of the 27th Brigade Group preparing for an infantry-tank assault exercise near Hohne, Germany. The tank is a Centurion.

Tanks and crews of the Windsor Regiment (22nd Reconnaissance Regiment), a Canadian Army (Militia) unit, lined up in the training area at Petawawa Camp.

undergraduates as officers, the Army machinery used being university contingents of the Canadian Officers Training Corps. The second consists in the Canadian Services Colleges. The third, in which both the C.O.T.C. and the Services Colleges play parts, is the Regular Officer Training Plan.

The Canadian Officers Training Corps, which has existed since 1912, provides officers for both the regular and reserve forces. Theoretical training is given during the college year, while the student gets his practical work with a regular army unit during the summer vacation—and draws pay while he gets it. The Canadian Services Colleges are the Royal Military College at Kingston, Ontario, which has made officers for Canada since 1876; Royal Roads, near Victoria, B.C.; and the Collège Militaire Royal de St-Jean at St-Jean, Quebec. They provide a program combining military training with academic studies of university standard. The normal Army course is four years; the first two may be taken at any of the three colleges, the last two are taken at R.M.C. As for the Regular Officer Training Plan, under it selected students entering one of the Services Colleges or a university are enrolled and paid as officer cadets while completing their education. Cadets who wish to serve in non-technical arms and have satisfactory academic records are eligible for full status as regular officers on completing two years of their academic courses and the concurrent phases of C.O.T.C. training.

In addition, an Officer Candidate Program is conducted at corps schools and in regular units to afford an opportunity for individuals without university degrees (including suitable men of the regular army with junior matriculation standing) to qualify for short-service commissions. Short-service officers may be selected for permanent commissions after two and a half years' satisfactory service.

The modern Army requires a great number of tradesmen and specialists with particular skills. As many as 185 individual trades and specialties are recognized, and soldiers qualified in these may draw trades pay (additional to the normal pay of their ranks) running as high as $60 per month. The required tradesmen are obtained by training soldiers already serving, by enlisting trained men from civil life, and through an apprentice training scheme. Trades training, and specialized corps training generally, is carried on at the "corps schools" such as the Royal Canadian School of Signals at Vimy Barracks, Barriefield, near Kingston, or the Royal Canadian School of Military Engineering at Chilliwack, B.C.

Under the Apprentice Training Program boys with a Grade VIII or equivalent education

Training in Arctic warfare. Members of the 1st Bn. The Royal Canadian Regiment prepare to meet an "attack" during exercises near Fort Chimo.

who have passed their 16th but not their 17th birthday may be enrolled for training as tradesmen at a rate of pay half that of an ordinary recruit private. They receive academic as well as military and trades training. The training program normally lasts two years, but on reaching the age of 17 the soldier apprentices are given full pay. This program, in combination with the work of the Royal Canadian Army Cadets, organized in schools throughout the country, is producing large numbers of fine young recruits for the Army.

The Canadian Army (Militia)

We have written at length about the enlarged regular force which is the modern Army's most novel feature. Today, for the first time in history, the regular force is as large as the Militia (an ancient and honourable designation which was revived in 1954 to replace the term "Reserve Force" used since the Second World War). There is only space here to recall that the Militia still plays a most vital role in national defence. Under "Cold War" conditions a considerable regular force is a necessity. But if our best hopes were disappointed and we were again faced with a major war, that regular force would immediately become inadequate, and Canada, faced with the need for mobilizing a really large army, would turn, as she so often has before, to the famous old regiments of her Militia as the basis of it. To enhance the Militia's effectiveness, while safeguarding its best traditions, a reorganization, involving some alterations in the balance between the arms and adjustments to

Men of the 1st Bn. Royal 22e Régiment attack under cover of smoke during an exercise near Fort Chimo, in northern Quebec, February 1952.

Exercise "Sweetbriar". An anti-aircraft gunner of the "Aggressor Force" stands sentry on the sunset watch.

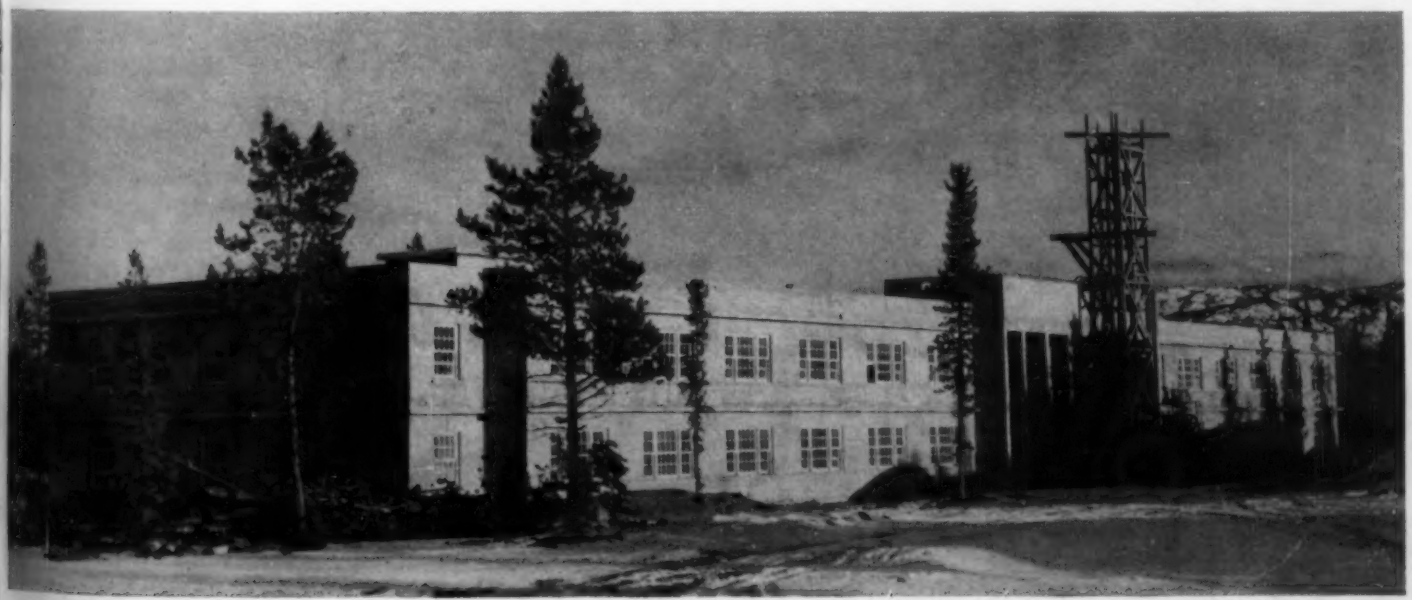
headquarters, was put into effect in June 1954.

Since 1945, the main object of Militia policy has been to produce qualified officers and non-commissioned officers, the elements most vital to effective mobilization in emergency. The regular force has helped in the training and administration of the Militia; the Militia on its side has produced many excellent officers and men for the Regular Army.

* * *

In the perilous world of today Canada needs an efficient army more than ever before. Some people, contemplating the appalling power of the new weapons of mass destruction partly unveiled during 1954, have wondered whether "conventional" armaments have not ceased to be significant and even whether defence has not become a hopeless concept altogether. The new and terrible weapons have demanded a careful reassessment of military organization, training and tactics. But one thing is quite clear. If the good sense of mankind and the fear of these devices fail to avert another disastrous conflict, victory will not go to the side that relies on the new weapons alone. It will go to the side that integrates them most effectively with the other arms available to a modern state, and which adapts its tactics to the new conditions so as to make the most efficient use of every weapon, old and new. The Canadian Army, possessing the advantage of close liaison with the armies of the United Kingdom and the United States, is not behind any other army in its consideration of the problem.

A barrack at Whitehorse, Yukon, houses Royal Canadian Engineers on maintenance duties on the North-west Highway system.



EDITOR'S NOTE-BOOK

Angus McGugan (*Shipbuilding in Canada*) is a Canadian Maritime Commissioner. He served his apprenticeship on the Clyde, and after sailing with Canadian Pacific steamships he was appointed designing engineer in Montreal. During the war he was Director of Production, Shipbuilding Division, in the Department of Munitions and Supply. He is a member of The Engineering Institute of Canada and of the Institution of Engineers and Shipbuilders in Scotland. Prior to joining the Maritime Commission he was General Manager of the Canadian Shipbuilding and Ship Repairing Association.—Mabel E. Jordon (*The Century Old Bastion at Nanaimo*) writes articles about interesting historical landmarks in western Canada. She lives in Calgary where her husband is an engineer.—A. E. Porsild, M.B.E. (*Land Use in the Arctic*, concluded) was assistant at the Danish Biological Station in Greenland from 1923 to 1926, when he was appointed Botanist to the Government of Canada. He has been chief botanist to the National Museum of Canada since 1936. He has made many expeditions within the Arctic Circle and is a world authority on Arctic plant life.—Col. C. P. Stacey, O.B.E. (*The Canadian Army Today*) was educated at the Universities of Toronto, Oxford, and Princeton. He left Princeton, where he was assistant professor of history, to serve at Canadian Military Headquarters overseas through the recent war. Since 1945 he has been Director of the Historical Section, at Army Headquarters in Canada. His book, "The Canadian Army 1939-1945", won the Governor General's award for academic non-fiction in 1948.

Land Use in the Arctic

(See page 20)

References

Anonymous (1922) — Reindeer and Musk-ox. Report of the Royal Commission upon the possibilities of reindeer and musk-ox industries in the arctic and sub-arctic regions. Dept. of the Interior, Ottawa.

Balzak, S. S., Vasyutin, V. F. and Feigin, Ya. G. (1949) — Economic Geography of the U.S.S.R. American Edition edited by Chaucy D. Harris, MacMillan Co., New York.

Banfield, A. W. F. (1950) — The Barren-Ground Caribou. Can. Wildlife Service, Dept. Resources and Development, Ottawa, (mimeogr.)

Colby, M. (1939) — A guide to Alaska. Am. Guide Series. MacMillan Co., New York.

Druri, L. V. (1936) — "Reindeer-pasture in the chukchee Anadyr district". (In Russian with English summary): Trans. Arctic Inst. of the U.S.S.R. No. 62. 105-124, Leningrad.

Hahn, E. (1896) — Die Hausthiere u. ihre Beziehungen z. Wirtschaft des Menschen. Leipzig.

Isaachsen, H. (1917) — Lav som dyrefor. Landbruks-departementets Smaaskr. No. 7, 1-10, Kristiania.

Jackson, Sheldon (1893) — Report on introduction of domestic reindeer into Alaska. U.S. Senate Misc. Doc. No. 22 1-39, Washington, D.C.

Jacobsen, N. Kingo and Sveistrup, P. P. (1950) — Erhverv og Kultur langs polarkredsen. København.

Lantis, Margaret (1950) — The reindeer industry in Alaska: Arctic, Vol. 3.29-44.

Laufer, Berthold (1917) — The reindeer and its domestication. Mem. Am. Anthrop. Association, Vol. 4:91-150.

Mecking, Ludwig (1928) — A regional geography of the Arctic and the Antarctic. The Geography of the Polar Regions. Am. Geogr. Soc. Spec. Publ. No. 8.

Mirov, N. T. (1945) — Notes on the domestication of reindeer. Am. Anthropologist, N.S. vol. 47:393-408.

Nansen, Fr. (1914) — Through Siberia the land of the future. Wm. Heinemann, London.

Palmer, Lawrence J. (1926) — Progress of reindeer grazing investigations in Alaska. U.S. Dept. of Agric. Bull. 1423, Washington, D.C.

.... (1929) — Improved reindeer handling. U.S. Dept. of Agric. Circular No. 82, Washington, D.C.

.... (1934) — Raising Reindeer in Alaska. U.S. Dept. of Agric. Misc. Publ. No. 207, Washington, D.C.

.... and Hadwen, S. (1922) — Reindeer in Alaska. U.S. Dept of Agric. Bull. No. 1089, Washington, D.C.

Porsild, A. E. (1929) — Reindeer grazing in northwest Canada. Dept. of Interior, Ottawa.

.... (1936) — Rener or Eskimoer i Kanada. Grønl. Selsk. Aarsskr. p. 1-24, København.

.... (1936a) — The reindeer industry and the Canadian Eskimo. Geogr. Journ. Vol. 88:1-19, London.

.... (1942) — Reindeer and caribou grazing in Canada. Trans. N. Am. Wildlife Conf. Vol. 7:381-391.

.... (1947) — Report on the reindeer and the Mackenzie Delta Reindeer Grazing Reserve (manuscript).

.... (1953) — Edible plants of the Arctic. Arctic, Vol. 6:15-34.

Rink, H. (1857) — Grnøland geografisk or statistisk beskrevet. 2 vols. København.

Seton, E. T. (1912) — The Arctic Prairies. London.

Sosnovsky, G. P. (1933) — "Ancient traces of animal husbandry in the Baikal region". (In Russian) Izv. Gosud. Akad. Istorii Mater. Cult. Vol. 100.

Tallgren, A. M. (1933) — Inner Asiatic and Siberian rock pictures. Eurasia Septent. Antiqua, Vol. 8:174-210, Helsinki.

Vassiliev, V. N. (1936) — "The reindeer range in Anadyrland". (In Russian with English Summary). Trans. Arctic Inst. of the U.S.S.R., Vol. 62:9-104. Leningrad.

Voshchinin, V. P. (1932) — History, present policies and organization in the U.S.S.R. Pioneer Settlement. Am. Geogr. Soc. Spec. Publ. No. 14.

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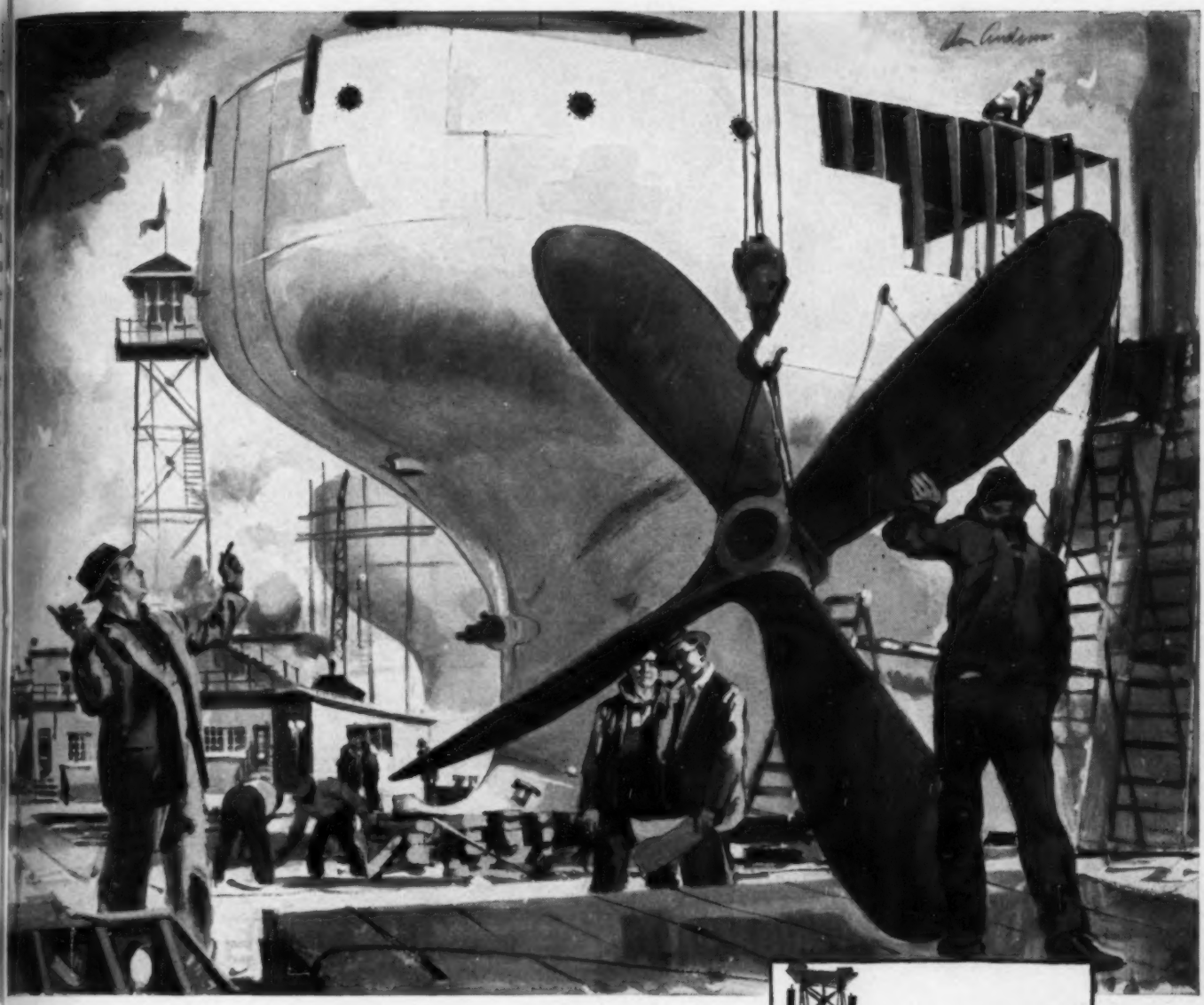
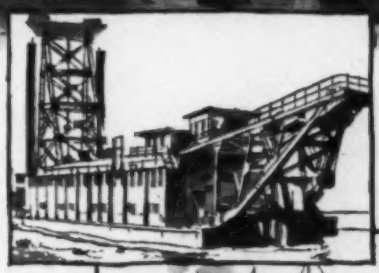
(Continued from page V)

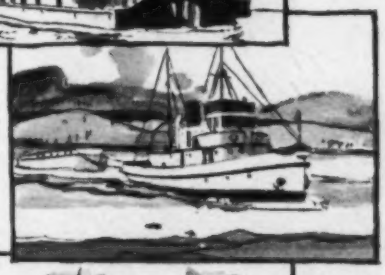
somewhat exotic character. Mr. Durrell shows an eclectic taste when animals are concerned. Despite the fact that his work is serious enough he approaches it in a light-hearted tone. The chapters are so absorbing that one puts the book down with a mild feeling of surprise that one is still at home instead of roaming the forests and river banks of British Guiana in search of such attractive creatures as lizards who look like emerald dragons waiting for St. George; red howler monkeys, sloths, anteaters, and armadillos besides other strange rodents and reptiles with fantastic names. Mr. Durrell's methods of capture were singularly direct, usually a tactical approach ending in a strategic grab. It was effective but had its disadvantages when the captive was a sloth whose claws resemble grappling irons. The sloth can grab too.

There were of course, the inevitable escapes and when an enraged anaconda takes possession of the kitchen in a three roomed ricketty hut it seems only reasonable that the name of the village where this happens should be Adventure. Another escape was that of an electric eel, much valued, but hardly a pleasant companion in a small canoe. So when the bottom of the basket containing the eel dropped out, the author did nothing to hinder its swift flight overboard. Most of Mr. Durrell's captives, except the caymans, were of a size that he could carry in his arms, a feat usually accompanied with bites and scratches. He and his two companions travelled very light with a minimum of gear, sometimes a bit of string being the only tackle used in the field. The author makes light of his hardships but does not deny their reality, specially when it comes to crating up five hundred living creatures for a long sea voyage, and persuading them to remain alive and well on an alien diet and in a climate very different to their native Guiana. One feels that he succeeded not only through his technical knowledge of his job but also through his real sympathy and affection for the animals he handles.

S. SEELEY







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The Indus Civilization

by Sir Mortimer Wheeler

(Macmillan, Toronto, $3.50)

Recent archaeological work in northern India has made necessary the writing of this supplementary chapter to "Ancient India", the first volume of *The Cambridge History of India*, published in 1922. The principal excavations, described here in some detail, were at Harappa in the Punjab and at Mohenjo-daro in the Larkana district of Sind.

For some time, steatite seals with animal designs and fragments of a still undeciphered script had been known from Harappa, but it was not until investigation by competent archaeologists was begun that the high degree of culture attained by the inhabitants of this early site was appreciated. Preliminary estimates date this civilization as extending from 2500-1500 B.C. In Mohenjo-daro the skeletons of many men, women, and children were found lying in the streets and houses, unburied, and some of them showing skull wounds which were probably the cause of death, and one can only conclude that the city was over-run and destroyed by invaders, most likely the Aryan-speaking people who are known to have penetrated India at about 1500 B.C.

Implements of copper and bronze, wheeled vehicles, extensive granaries, well-built homes, and spacious shops were revealed as well as pieces of the earliest cotton cloth yet found. It was lying in contact with objects of silver or copper and the metallic salts formed in the damp alkaline soil acted as a preservative. One of the minor finds was the imprint of a cat's foot in a sun-dried brick, with that of a dog over-lying part of it. "The two tracks on the brick must have been impressed when it was freshly laid out in the sun to dry. The deep impress of the pads and their spread indicate the speed of both animals".

Well-illustrated and interestingly written, this is a good example of how a technical subject may be made acceptable to the non-specialist with no loss of importance or of accuracy.

DOUGLAS LEECHMAN